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ABSTRACT

With a view to improving information systems and services in Eastern, Central, and Southern Africa, this Information Systems Workshop was organized by the East and Southern African Management Institute (ESAMI) with assistance from the Coordinating Centre for Regional Information Training (CRIT). The specific aims of the workshop were to acquaint the 26 participants with the various concepts of information systems and services; to familiarize the participants with the latest techniques in information technology for collection, storage, retrieval, and dissemination of information; and to assist participants in understanding the organization and administration of information services. The workshop report comprises the following lectures: (1) "Conceptual Foundations of Information Theory" (Francis Inganji); (2) "Information Analysis: Indexing and Retrieval" (Augustine Musana); (3) "Communication of Information" (Francis Inganji); (4) "Information Analysis: Classification Systems and Thesaurus" (Ulrich Gehrke); (5) "Case Study--Indexing" (Ulrich Gehrke); (6) "The Role of Information in Decision Making" (Martin Shio); (7) "Acquisition and Processing of Documentary and Other Sources of Information" (Augustine Musana); (8) "Introduction to Information Systems and Services" (Francis Inganji); (9) a sample of a questionnaire on information and documentation facilities; and (10) "Records Management" (Francis Inganji). A glossary, a bibliography, KWIC Index example, evaluation questionnaire, evaluation comment, and list of participants are appended. (THC)

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COORDINATING CENTRE FOR REGIONAL INFORMATION TRAINING

REPORT

INFORMATION SYSTEMS WORKSHOP

MAY 19TH - 31ST 1980

NJIRO HILL, ARUSHA, TANZANIA

organised by

EASTERN AND SOUTHERN AFRICAN MANAGEMENT INSTITUTE

with
assistance from

CRIT-Coordinating
Centre for Regional
Information Training
Nairobi

Joint Programme of
The Kenya National Academy
and
German Foundation for
International Development

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Edited by
Mr. Francis Inganji

REPORT

ON

INFORMATION SYSTEM

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INTRODUCTION

Information Systems form an essential part of the chain of human communication. Before knowledge was recorded (and even to this day in very primitive societies), individuals formed the repository of knowledge, the bridge between successive generations and between those who generated new information and those who required to use it. The amount of information that can be passed on in this way is limited, and society began to move forward when information of various kinds began to be recorded in relatively permanent forms which could serve as a substitute for the "wise man" in person.

Nowadays with what is termed "literature explosion", it becomes difficult for an individual to keep pace with even a small fraction of it, and the problem that most people face is that of ensuring that individuals who need information can obtain it with the minimum of cost (both in time and in money), and without being overwhelmed by large amounts of irrelevant matter. The concern about organized and processed information has made many organizations in the world improve to "management information systems".

With a view to improving information systems and services in Eastern, Central and Southern Africa, this Information Systems Workshop was organised at Arusha from May 19th to 31st 1980. This workshop was organized by the East and Southern Africa Management Institute (ESAMI) with assistance from the Coordinating Centre for Regional Information Training (CRIT). This was a repeat of another similar workshop, which had been held in 19[illegible]. In view of the great demand for this type of workshop, the Institute has decided to make it a yearly event.

WORKSHOP OBJECTIVES

Such workshops are intended to serve the needs of information specialists who are already in the information field. The specific aims of such workshops are:

a) To acquaint participants with the various concepts of information systems and services.

b) To familiarise the participants with the latest techniques in information technology for collection, storage, refrieval and dissemination of information.

c) To assist the participants in understanding the organisation and administration of information services.

PARTICIPANTS

Participants to this workshop were limited to 26 persons working in the information field. Participants were expected to have had considerable experience in the information field, and who pocess good academic qualifications, at least a first degree or its equivalent.

COURSE CONTENTS

The course inter alia covered the following topics:

a) Conceptual foundation of information theory

b) Sources of information

c) Information processing

d) Technology of information

e) Organisation and administration of information services.

FACULTY

Various members of the Eastern and Southern Africa Management Institute conducted this course. In addition,

distinguished lecturers from other organizations participated.

The German Foundation for International Development, through the CRIT programme paid for the participants fees, accommodation and a return ticket economy class to Arusha.

I hope that this workshop benefited the participants, and that they will be able to use some of the knowledge they gained from this workshop in their day to day duties.

FRANCIS INGANJI

SOME OF THE LECTURES

DELIVERED DURING THE WORKSHOP

CONCEPTUAL FOUNDATIONS OF INFORMATION THEORY

by

Francis Inganji

Importance of Theories

What good are theories and concepts? Why not get the part where we learn "how"?

a) There is a very practical need for concepts and theory for problem solving.

b) They provide a framework for thinking about and simplifying a problem.

c) The framework assists in structuring the problem for solution and in choosing among available alternatives.

d) Theory and concepts are very valuable in education and training. They aid in generalizing it for transmission to others.

e) The concepts and theoris underlying information systems are sometimes un precisely defined, and the relevance of the concepts to information system analysis and design ranges from weak to strong.

Note:

The field of information systems is embryonic, and the connection between the theoretical and the practical will certainly be strengthened as additional experience is gained and additional research is performed on the connection between theory and practice.

This Lecture will Cover the Following

1. Definition of information
2. Information in the mathematical theory of communication

which will include:

i) Historical development

ii) Model of communication system

iii) Mathematical Definition of information

iv) Entropy

v) Redundancy

3. Data Reduction

i) Classification and compression

ii) Organizational summarizing and filtering inferences

4. Quality of Information

5. Age of Information

6. Application of Information Concepts to information system design.

Introduction

Management information systems deal with information: but what is information? How much information does an information system provide? There is no method for measuring the complexity of information, and this makes it unlikely that there will even be a formula or algorithm for computing content. However, we have several concepts and analogies which are useful in partially answering these questions.

Definition of Information

1. "Information" is an imprecise term as commonly used. If I can refer to raw data, organized data, the capacity of a communication channel etc.

2. Underlying the use of the term "information" in information systems are several ideas:

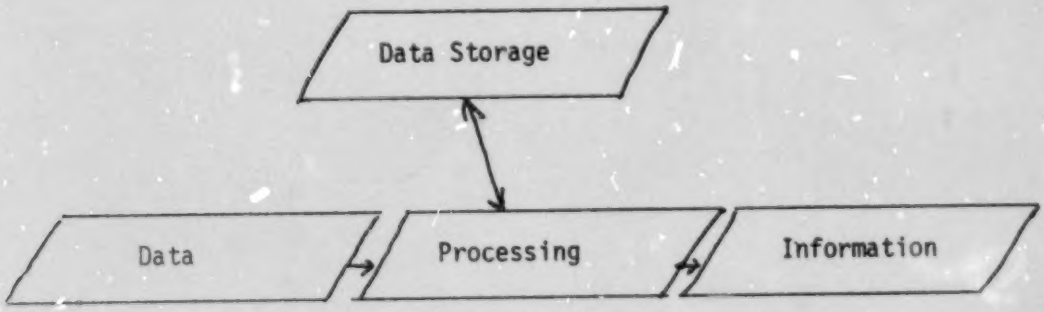
a) Information adds to a representation, it has surprise value, or it tells something the receiver did not know or would

not predict.

5) In a world of uncertainty, information reduces uncertainty.

3. A useful general definition of Information for Information Systems purposes is the following:
"Information is data that has been processed into a form that is meaningful to the recepient and is of real or perceived value in current or prospective decisions".

4. The relation of data to information is defined as that of raw material to finished product.



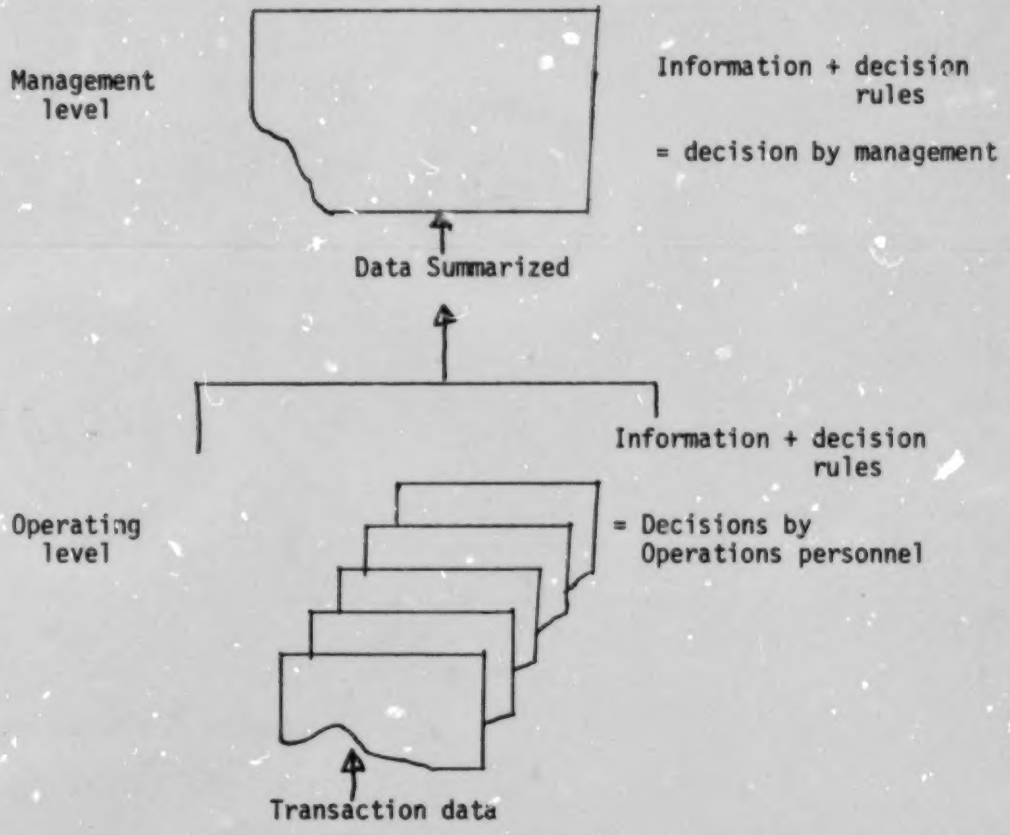
In other words the information processing system processes data into information, or more precisely the processing system processes data in unusable form into usable data that is information to the intended recepient.

5. The analogy of raw material to finished product illustrates the concept that information for one person may be raw data for another-just as the finished product from one manufacturing division may be the raw material for another division.

Note: That the relationship between data and information, makes these two words be used somewhat inter-changeable.

6. The value of information is related to decisions. If there were no choice or decisions, information would be unnecessary. The decisions can range from simple, repetitive decisions to long-range strategic ones.

DATA: The raw material for information, is defined as groups of non random symbols which represent quantities, actions, things, etc. Data is formed from characters. These may be alphabetic, numeric, or special symbols such as, & and £. Data is organized for processing purposes into data structures, fine structures, and data bases.



The above figure:

Data for one level of an organization may be infomation for another.

7. Information, in the information system sense may have several attributes.

1. True or false.

   It may coincide with reality or not. If the receiver of false information believes it to be true, the effect is the same as if it were true.

2. New

   It may be completely new and fresh to the recepient

3. Incremental

   It may update or add new increments to information already available

4. Corrective

   It may be a correction of past false information

5. Confirmatoty

   It may confirm existing information. This is still valuable because it increases the recipient's perception of the correctness of the information.

SUMMARY

The terms "data" and "information" are often used inter-changeably but there is a distinction in that, data is the raw material that is processed to provide information. Information is associated with decision making, and for this reason information can be considered as at a higher, more active level than data.

INFORMATION IN THE MATHEMATICAL THEORY OF COMMUNICATION

1. The term "information theory" is often used to mean the mathematical theory of communication. The mathematical theory has direct applications in mechanical and electronic communications systems. It is limited in its practical use for Management Information Systems. Nevertheless, the theory does provide insight into the nature of information.

HISTORICAL DEVELOPMENT

1. Information theory was suggested by Norbert Weiner, a well known mathematician, as a result of his study of cybernetics. Weiner's contention was that any organism is held together by the possession of means for acquisition, use, retention and transmission of information.

2. Clande Shannon of Beu Laboratories developed and applied concepts to explain communications systems, such as the telephone systems. In the context of the Shannon Work and most subsequent study, information theory has developed primarily as a mathematical theory of communication.

Problems of Information Communication in Information Systems

Technical level

How accurately can information be transmitted?

2. Semantic level

How precisely do the transmitted symbols convey the desired meaning?

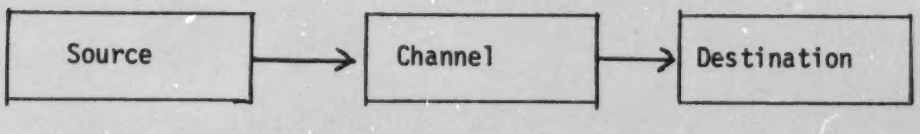
3. Effectiveness level

How suitable is the message as a motivation of human action.

The mathematical theory of communication deals with the technical level and does not consider meaning or effectiveness.

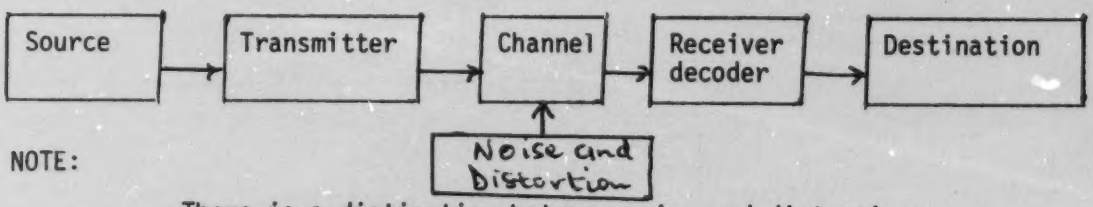
Model of a communication system

A simple model of a communication system takes the following form:



There is a transmission which provides coded symbols sent through a channel to a receiver. The message which comes from a source to the transmitter before it can be sent through the communications channel and must be decoded by a receiver before it can be understood by the destination.

The Expanded Diagram of a Communication System



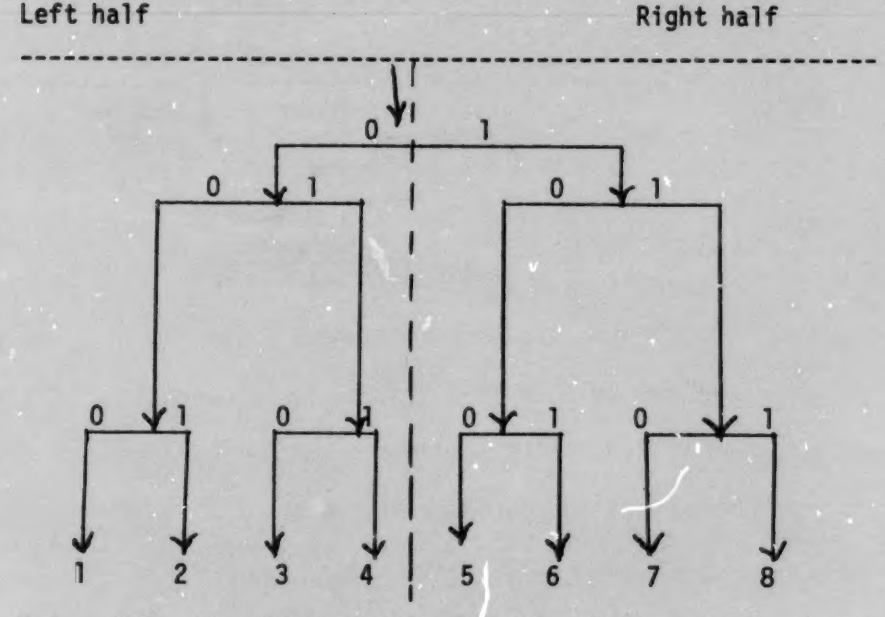
NOTE:

There is a distinction between noise and distortion. Distortion is caused by a known (even intentional) operation and can be corrected by an inverse operation. Noice is random or unpredictable interference. The purpose of a communication system is to reproduce at the destination a message selected at the source.

MATHEMATICAL DEFINATION OF INFORMATION

1. As used in the mathematical theory of communication, information has a very precise meaning. "It is the average number of binary digits which must be transmitted to identify a given message from the set of all possible messages to which it belongs. In other words, the theory says that there are a limited number of messages which may need to be transmitted.

2. It is therefore possible to devise a different code to identify each message. The message to be transmitted is encoded, the codes are sent over the channel and the decoder identifies the message intended by the codes. Messages can be defined in a variety of ways. For example, each alphanumeric character may be a message or complete sentences may be messages if there is a limited predefined number of such sentences to be transmitted.



Code mobile for eight equally probable messages.

3. The size of the code is of course dependent on the coding scheme and the number of possible messages. The coding scheme for information theory is assumed to be binary.

4. One bit is defined as the amount of information required to identify one of two equally probable messages. In other words, if the communication system is required to respond to only two messages "yes" or "no", then the system needs to transmit only two possible signals which can be represented by 1 and 0, the two values in the binary system.

The information content (or code size in bits) may be generalized as:

$$1 = \log_2 n$$

where n = the number of possible messages and all messages are equally likely.

5. Information reduces uncertainty. Given a set of messages, the receiver does not know which one (is uncertain) until information is received. Partial information will reduce the uncertainty but not eliminate it.

6. The more uncertainty exists the more information is required. For example, a message consisting of random alphabetic characters contains more information than an English text because the random set is completely unpredictable (1 = 4.75) and the English text is somewhat predictable.

7. Shannon estimated that the average number of bits required to encorde English text would be only 1 bit per letter if each code was based on groups of letters rather than single letters.

ENTROPY

1. The term has been borrowed from thermodynamics. It describes the relative disorder or randomness in a system.

2. Information is a measure of order in a system and is the opposite of entropy; it reduces uncertainty and therefore reduced entropy.

3. The formula for information is frequently termed as the "entropy" function". The reason being that since information (disorder), the amount of information required is also a measure of the disorder or entropy to be reduced.

REDUNDANCY

1. A Communication is rarely if ever completely composed of information. There are usually redundant elements. Redundancy sounds bad because it indicates unnecessary elements. However some redundancy is desirable for error control. In the model of a communication system, there was noise in the channel. This means that the received message may not be exactly as sent.

2. The transmission of redundant data allows the receiver to check whether the received message is correct and may allow him to reconstruct the correct message.

3. Error detecting codes using parity bits make use of redundancy to detect and also correct errors in transmission. There are a large number of possible codes so that the communication engineer can design the codes to achieve a specific level of accurate transmission.

DATA REDUCTION

1. The constraints on information systems and on humans as data processors require that various means be used to reduce the quantity of data stored or presented for human use. These methods are

classification and compression, organizational summarizing and filtering and inference.

CLASSIFICATION AND COMPRESSION

1. Rather than transmitting all individual data items, the system may classify items to reduce the data volume. The totals for the different classifications represent a compression of data.
2. The Managing Director of an organization cannot normally review each sale to get information for decisions. Instead the accounting system summarizes all sales into a "Sales for the period", total. This may be too gross and obscure information for decision pupposes so that the system may provide sales by product group, geographical area or other classification.
3. The level of summarization is dependent on the level of the decision maker. For example, the Managing Director may need only the total sales by area, but the sales manager for the area may need sales by sales representative and sales by product.

ORGANISATIONAL SUMMARIZING AND FILTERING

1. "Messages" are summarized in various ways as they move up the organization, the efficiency of communication depending on the organizational methods for eliciting the data and the communication channel provided for them.
2. Unless there is a formal procedure to classify, summarize, and transmit them to decision makers, the signals may be filtered out by intermediate organizational elements.
   e.g. Customer complains of salesmen's tactics in a sales district may be blocked by the district sales manager who does not wish the criticism to reflect on him and who may feel he can remedy the situation himself.

INFERENCES

1. March and Simon use the term uncertainty absorption for the form of data reduction that occurs when inferences are drawn from a body of data and the inferences instead of the data itself is communicated in the organization.

2. This results in substantial data reduction. The inference may be based on quantitative data such as information from questionnaires on employees or may be more subjective inferences reflecting a set of non-reproducible inputs to the inferential process.

QUALITY OF INFORMATION

1. Information varies in quality because of bias or errors. Bias is illustrated by the example of a sales representative who tends to over estimate expected sales or who quotes unrealistic delivery dates.

2. Error is a more serious problem because there is no simple adjustment for it. Errors may be a result of:

   a) Incorrect data measurement and collection methods

   b) Failure to follow correct processing procedures

   c) Loss of non-processing of data

   d) Wrong recording or correcting data

   e) Incorrect history (master) file (or use of wrong history file),

   f) Mistakes in processing procedure (such as computer program mistakes)

   g) Deliberate falsification.

3. Difficulties with errors may be overcome by:

   a) Internal controls to detect errors.

   b) Internal and external auditing

c) Addition of "Confidence limits" to data

d) User instruction in measurement and processing procedures so users can evaluate possible errors.

NOTE: The first two methods attempt to reduce the uncertainty, about the data and therefore increase the information content. The second two remedies attempt to provide the user with confidence limits.

AGE OF INFORMATION

1. This is the age of information with respect to information contained in periodic reports. Two types of data are defined.

2. Condition data which pertains to a point in time such as December 31st. An example is the inventory at 12/31/73 as reported on the balance sheet.

3. Operating data which reflects changes during a period of time. Examples are inventory used during a month or sales for a week.

An information Interval:

Is defined as the interval between reports e.g. for weekly reports the information interval is one week.

b) The reporting delay:

is defined as the processing delay between the end of the information interval and the issuance of the report for management use.

Minimum age is the processing age.

Maximum age of condition of information is the delay plus the processing interval.

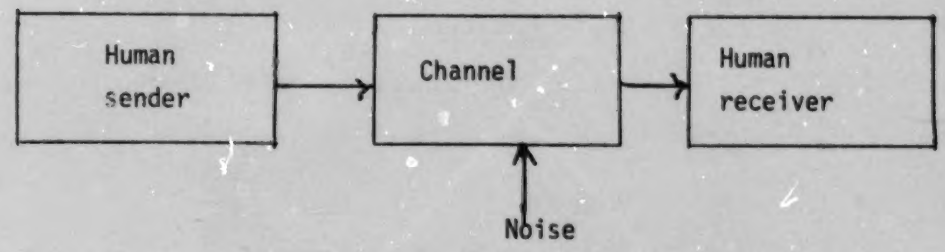
NOTE: The most important concept for information system design relative to the age of information is the impact of both the information interval and the processing delay.

APPLICATION OF INFORMATION CONCEPTS TO INFORMATION SYSTEM DESIGN

Concepts of information in information theory already outlined are: Data reduction, quality of information, and age of information. These concepts can be applied to information systems design in the following ways:

1. The mathematics of information theory has been applied in communication system design. The mathematics does not apply in the more complex management information system environment, but the insights provided by the theory are several.
   a) Information has surprise value
   b) Information reduces uncertainty
   c) There is no information unless there is choice
   d) Not all data that is communicated has information value.
   e) Redundancy is useful for error control of communication.

2. The basic model of a communication system in information theory is more complicated when humans are included. The humans are goal-directed self-adaptive systems, which of course, makes them more difficult to describe than a hardware communication system.



(frame of reference, prejudice, physical disturbance etc.)

3. The existence of noise is explicitly defined in communication theory. Redundancy is used to ensure correct receipt of the transmitted message.

4. In management information systems, there is substantial noise due to the differing backgrounds of humans, differing frames of reference, varying prejudice, level of attention, physical differences in ability to hear, see, and other causes.

5. Redundancy can be effectively used to overcome noise and improve the probability of the message being received and interpreted correctly.

6. The need for data reduction has resulted in various mechanisms, all of which are relevant to the design of processing systems, classification and compression, organizational summarizing and filtering, and inferences. These methods reduce the volume of data storage and especially reduce the amount of data transmitted to human receivers.

7. The information quality concepts apply to information system design in the provision of methods to detect and adjust for bias and methods to detect, control and reduce errors.

8. The concepts relating to age of information introduce the idea of condition data measured at a point in time and operating data which cover a period of time. The concepts of an information interval plus a processing delay are important to information system design because the age of information is related to both factors and not just to the processing delay. The concept of information interval is also a useful one when considering more flexible computer based systems.

INFORMATION ANALYSIS: INDEXING AND RETRIEVAL

By A. MUSANA

OBJECTIVE

This session is intended to give participants a basic understanding of indexing; problems involved in indexing and factors affecting indexing language; basics of and factors affecting operation of information retrieval. It is hoped that this will give the participants and understanding of how to design an optimal information retrieval system.

TOPICS

Information Analysis

Indexing

- : Descriptive Indexing
- : Subject Indexing
- : Process of Subject Indexing
- : Limitations
- : Storage

Information Retrieval

- : Elements in IRS
- : Search Tools
- : Query Analysis
- : Search Strategy
- : Search Methods
- : Results of Retrieval
- : Limiting factors.

1. INFORMATION ANALYSIS

This is defined as the analysis of subject contents of documents purposely for selecting all the characteristic according to which the documents could be retrieved. The analysis is carried out in anticipation of the interests of the potential users of the Information retrieval system.

2. INDEXING

This is the assignment of index terms to documents or objects for the purpose of enabling later the retrieval of documents or objects according to selected concepts represented by index terms. It acts as a bridge between documents in a file and as a tool for finding the document or information.
An index is an organized reference. list of contents of a file including references for either identification of location of the contents.

2.01 TYPES

2.011 Descriptive Indexing

This is a process of distinctly identifying and describing a document. It includes such things as use of an accession number, publication year; author (s); year received, and if necessary day of year received.

Example:

824025	-	Accession no.
80	-	Year of publication
31	-	Day of year received
025	-	Sequence received during the day.

In addition the author and title of document; features such as illustrations; paging bibliography are included in the description.

2.012 Subject Indexing

This is the description of the subject content of a document.

2.0121 Process

: Text analyzed purposely to select the concepts which seem to the indexer to be potentially useful to the users of the index.

: Translation into some standardized or controlled terminology using subject heading list or authority list.

: Compilation of the total index terms into some order using a set of rules.

2.0122 A word about controlled and uncontrolled vocabulary.

2.01221 Controlled Vocabulary

In this system the words and for phrases are indexed from some kind of predetermined list.

Example of lists

: THESAURUS such as the CAFRAD'S Thesaurus of Administrative Information Descriptors

: SUBJECT LISTS such as Sears List of Subject Headings

: INDEXES TO CLASSIFICATION SCHEMES such as Index to Dewey Decimal Classification etc.

2.0123 Uncontrolled Vocabulary

In this case the words and phases are indexed as in context of title of document. Use of predetermined list or thesaurus does not arise. This is referred to as natural language indexing. This seems to be suitable to small subject collections or files where the terminology tends to be reasonably consistent.

Examples

KWIC (Key word in Context). The title in this system is usually recirculated or wrapped around the keyword.

KWOC (Key word Out of Context): The keywords are extracted from the title and ordered alphabetically in the first position of a line with full title.

The KWIC, KWOC and other similar forms are used mainly in current awareness systems.

2.0124 Developing a Controlled Vocabulary System

You might be required to develop a small thesaurus for use specifically for your information service. Vocabulary being important as a guide for the searcher it is important that consideration is given to the needs of the user which should be balanced against the type of information to be recorded. There are several ways

i. Consult Classification Schemes; subject glossaries; subject heading etc. for concepts in use;

ii. Sample documents of same characteristics as those likely to be involved and extract significant terms from them;

iii Consult users and subject specialists.

2.0125 Relationships between terms

It is important to demonstrate the relationships between terms used such as synonyms; superordinate and subordinate and the functional and syntactical relationships. For instance, what does LOGICAL ANALYSIS mean, Analysis of Logic or Analysis for Logic? To avoid the semantic problems devices such as role indicators and links and weighting scope notes etc. could be used. These reduce noise or irrelevant information.

Example (1)

Descriptor	METAL POWDERS
Role Indicator	STARTING METAL

In this case the meaning of metal powders is limited to situations where they are used specifically as starting metal.

2.0126 Using the index or thesaurus

The purpose of the information retrieval system is to enable a user to find what he is looking for economically, and thereafter it follows that whatever terms are used in indexing the subject matter of a document should enable the user to find the item relevant to his query. It is important to follow the

chosen thesaurus or index which will have instructions on which pertinent terms to use for particular information.

2.0127 Generic Vs Specific Concepts.

A more generic descriptor will improve the recall ratio while of course lowering the relevance and precision ratios. In other words a searcher would be confronted with a lot of source documents a lot of which could be irrelevant.

---

(1) Kent, A. Textbook on Mechanized information retrieval. Interscience, 1962.

On the other hand a more specific descriptor will improve on the relevance and precision ratios while lowering the recall ratio.

Therefore in framing a descriptor(s) for subject content of a document, it is important that the descriptor that is chosen is specific enough.

3. LIMITATIONS

3.01 Frequency of Revision

As Allen Kent put it "Language is the expression of human thinking. It is subject to continuing change." Where the thesauri or index language is not frequently revised the indexer is likely to run into complications if he has a new subject or combination of subject. Librarians in, for instance, management science libraries using the Dewey Decimal Classification would know what this means.

3.02 General index for specialized field

In a lot of instances it is very difficult to use a general index for a specialized collection.

3.03 Indexer Limitation

The information specialist may be lacking knowledge of the subject area. Another problem could be lack of experience in indexing.

3.04 Users

The users may prefer what they may refer to as simplified indexing system. The information specialist may through training and experience know what would be the best indexing system for the particular area. The information specialist should try as much as possible to reconcile the two states.

Kent, Allen. Textbook of mechanized information retrieval. Interscience. 1962.

4. Storage of concept carriers

There are various ways of ordering the carriers or records. The order system will have an effect on the way in which the file system is searched. If the records were arranged randomly it would necessitate scanning the whole file in order to retrieve materials relating to a particular query. On the other hand if the file were arranged in a particular order there would be random access to any section of the file without having to go through the whole file during search.

5. INFORMATION RETRIEVAL

Information retrieval is defined as recovery of information (or source documents) that have been stored in a particular file or collection.

5.01 Elements of an Information Retrieval system (IRS)

A typical IRS is composed of

: An Information carrier which could be cards in a typical library card catalogue; magnetic tape or disc. etc.

: Descriptor: a concept(s) chosen out of so many to be included in a list of terms purposely to lead to retrieval of some information or source document or part thereof.

: Document address which could be primary i.e. giving the exact location of an item within a file or collection. For instance in a traditional library catalogue 658.3 PIG (for a library using UDC or DDC) would be a primary address for a book titled Personnel Administration: a point of view, by Pigors and Myers. On the other hand, the address might be secondary in that reference is made to an article in a journal. This would still necessitate primary address for the journal. Finally, the address could be tertiary in that reference is made to a page number in an index to, say, an abstracting journal.

Example of an element

DESCRIPTOR: MANAGEMENT EDUCATION: AFRICA

ADDRESS : 658.386(6)

CARRIER : CARDS IN A CATALOGUE

5.02 Search Tools

: Item entry-IRS where each carrier represent a source document. The search order is predetermined. The system does not permit the coordination of concepts, as may be necessitated by the nature of the query, at the searching stage.

: Term entry where the carrier represents or carries concept tag and minimal details such as serial numbers of source documents treating the same concept. The serial numbers representing the documents are put on the carrier. Included in this type are

: edge notched card system,

: machine punched card system

: optical coincidence system

: as the information needs become more and more sophisticated more flexible and fast retrieval systems are called into play.

The advantage with this is that it permits post-coordination of concepts of complex subjects during retrieval process as opposed to pre-coordinate indexing.

5.03 Query Analysis

The purpose of carrying out an analysis of a query or inquiry is to be able to transform the language of the inquiry into that of an information retrieval system. For instance, if a concept QUERY ANALYSIS were used for source documents on the subject, and a searcher came with something like IDENTIFICATION OF WHAT EXACTLY A USER OF AN INFORMATION RETRIEVAL SYSTEM IS LOOKING FOR, it is important that is the latter is narrowed down to QUERY ANALYSIS to be able to get at the relevant source documents. Query Analysis also assists in the determination of purpose of information.

5.04 Search Strategy

This is the way in which the results of the query analysis are combined for satisfactory search. It is important to formulate a search strategy that likely to yield more relevant information or source documents without at the same time producing too much irrelevant materials.

5.05 Search Methods or Techniques

Up to now the key to retrieval is the Boolean logic derived from the work of Boole viz. AND, OR, NOT.

Example

A and (B or C) = Term A and either Term B or Term C

(A and B) or C = Both terms A and B or Term C

(A and B and C) = All the terms.

The Boolean method is easily demonstrable on online search where for instance by virtue of instant interaction with the system the search can widen or narrow down the search terms depending on the results.

5.06 Results of Retrieval

In any system of retrieval there will always be some amount of irrelevant information retrieved. It is important to try and reduce the degree of irrelevancy. Finally, the user should be in a position to judge for himself what is really useful for a specific purpose out of what has been retrieved.

5.07 Some limiting factors

: File Size: a limited file or collection is likely to have a limited capacity for answering certain queries.

: Coverage of the Collection :
The file or collection may be quite comprehensive but it may lack in-depth to answer some of the queries.

: Index and search manpower

: Proficiency level of indexers and searchers.

: Complexity of index language

: Exhaustivity and specificity of the index language

: Time when answer to query is received.

In the end all these factors and others are likely to have an effect on:

Recall ratio

Relevance ratio

Precision ratio.

COMMUNICATION OF INFORMATION

By Francis Inganji

In the last two decades, dramatic increases in the scope and volume of scientific research have occured, as may be illustrated by the fact that the amount of scientific literature is doubling approximately every ten years (Price 1963).

For the scientist who needs to locate particular items of scientific information and the documentation specialist, who must make them readily available, the organization and management of this huge and expanding store of information is a serious problem. Increasingly radical solutions are being proposed. For example, some experts would like to scrap scientific journals and distribute their content piecemeal. Information retrieval and delivery systems are being developed to enable scientists to locate information quickly and effectively.

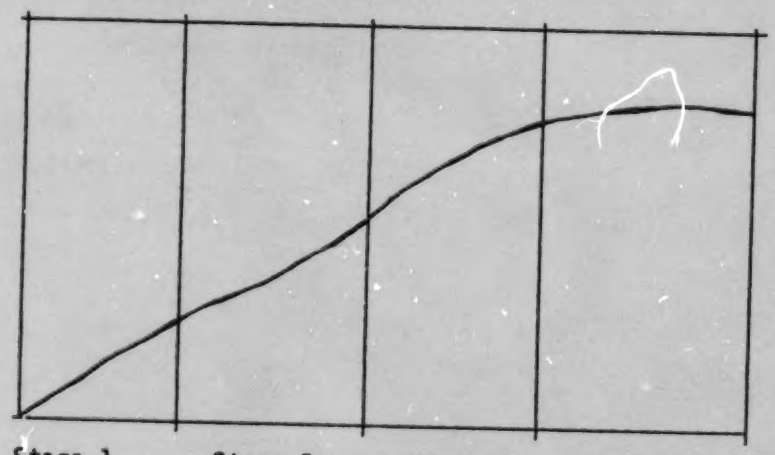
The growth of scientific knowledge, like that of most natural phenomena, takes the form of the logistic curve. The logistic curve has been fitted to the cumulative numbers of new publications appearing per year in scientific disciplines, (Price 1961, 1963). This means that the growth of numbers of new publications is passing through the following series of stages:

1. A preliminary period of growth in which absolute increments are small although the rate of increase is large but steadily decreases.
2. A period of exponential growth when the number of publications in a field doubles at regular intervals as a result of a constant rate of growth that produces increasing amounts of absolute growth.

3. A period when the rate of growth declines but the annual increments remain approximately constant.

4. A final period when both the rate of increase and the absolute increase decline and eventually approach zero. Price has argued that basic science is currently in the second phase of growth but that, as a result of shortages of resources and manpower, it will eventually enter the third and fourth stages.

CHARACTERISTICS OF SCIENTIFIC KNOWLEDGE AND OF SCIENTIFIC COMMUNITIES AT DIFFERENT STAGE OF THE LOGISTIC CURVE



Characteristics of knowledge	Stage 1	Stage 2	Stage 3	Stage 4
	Paradigm appears	normal science	solution of major problems appear	Exhaustive

Characteristics of Scientific communities	Little or no social organisation	Groups of collaborators and invisible college	Increasing controversy	Decline in membership

SCIENTIFIC COMMUNITIES AND THE GROWTH OF KNOWLEDGE

1. Social interaction plays a role in scientific growth.
2. Citations show that, the growth of scientific knowledge is a kind of diffusion process in which ideas are transmitted from person to person. The diffusion of many types of innovations has been shown to follow logistic growth curve.
3. Thus the exponential growth of scientific knowledge can be interpreted as a "contagion" process in which early adopters influence late adopters, which in turn creates an exponential increase in the numbers of publications and the numbers of new authors entering the area.

MODELS

1. Stresses continuous cumulative growth
2. Stresses it's absence
3. Another model includes periods of continuous cumulative growth interspersed with periods of discontinuity.

KUHN: Analysis of Scientific change (1962) that combines periods of cumulative growth, which he calls normal science, with periods of crisis or revolution. In his view, "normal" scientific activity in a research area is guided by a paradigm that defines the fundamental problems exclusively. As a result scientific knowledge grows in a systematic fashion, building upon previous work. The task of the

scientist is that of puzzle-solving rather than that of searching for entirely new scientific innovations in his research area.

4. In time, however, phenomena that the paradigm cannot explain become increasingly important. When these anomalies can no longer be ignored, the field goes through a period of crisis which the old paradigm is under attack and a new one is sought.

5. A new paradigm is generally resisted, particularly by older scientists. When the old paradigm has finally been rejected, much of the work that it stimulated is no longer considered relevant and ceases to be part of accepted knowledge in the field.

CRITICISMS

1. This does not imply a high level of solidarity among them since conflict and controversy are at a minimum.

2. It is during the periods of controversy that solidarity among opposing groups of researchers is likely to appear or, alternatively, during a period when a new field is being developed.

3. For example, one would expect considerable solidarity to develop between researchers at points when a break is being made with past work and a new theoretical approach is being created. The tension involved in rejecting an old point of view and replacing it with a new and somewhat speculative one would seem likely to produce strong ties between those who support the new view point in opposition to those who continue to support the older view point.

CONCLUSION

1. Interesting discoveries that provide models for future work (paradigms) attract new scientists to the area during stage one. In stage two, a few highly productive scientists set priorities for research, recruit and train students who become their collaborators, and maintain informal contact with other members of the area.

2. Their activities produce a period of exponential growth in publications and in new members in the area. As the implications of the ideas are exhausted or become increasingly difficult to test due to the appearance of anomalies that cannot be explained by the original model (stages three and four), new scientists are less likely to drop out, thus leading to a gradual decline in the number of new publications and in overall membership in the area.

3. Those who remain are likely to develop increasingly narrow and specialized interests as the possibilities for research dwindle or to be divided into factions on the basis of theoretical controversies. In the latter case, acceptance of a new paradigm leads to a new cycle of growth.

COMMUNICATION OF INFORMATION

Information has no value until it is used. The work of scientists, technologists, industrial workers and managers necesitates effective communication:

a) To stimulate thought and action by injection of, and interaction with, other people's ideas, knowledge, experience and achievements;

b) To promote continuous awareness of what others are doing so that individual workers (or groups), may know of developments in their own special fields and in wider fields such as disciplines or technology.

c) To diminish the probability of unwitting duplication of work and to save time and effort;

d) To provide introductory and background information for work in unfamiliar fields;

e) To provide specific information and data needed for work in hand;

f) To meet specific requirements as in 1.2 above.

In the past, communication took place largely through personal contacts and was informal and unorganized. To-day organized systems of communication are necessary, and their scale and complexity will continue to grow as:

a) the number of information users increases, along with the output of knowledge and information;

b) science, technology and industry develop in hitherto less developed parts of the world - Asia, Africa, South America, etc.;

c) specialization increases while at the same time the inter-penetration and inter-dependence of many branches of science also increase;

d) science, technology, and industry increasingly become large scale co-operative activities involving the co-ordination of the efforts of people who neither work together nor even know each other.

1.3.1 Forms and channels of communication

Communication of scientific and technological information embraces all relevant means of communication, including non-documentary forms. The large and effective part played by oral communication and personal contacts both formal and informal, is within the scope of organized information services. It is necessary for information professionals to develop, much more fully than at present, tools for facilitating non-documentary communication. Table 1.3.1 covers several forms of communication which can link information resources to an individual. At present only a few of them are organized by information systems and services.

These various channels of communication very considerably in effectiveness and in range of audience reached. Personal contact at individual or small group level is the most effective in idea creation, and in development of appreciation of concepts. Meetings, conferences and exhibitions are useful for spreading ideas and facilitating contacts. Exact information requires presentation in documentary form, to which attention is drawn or which is identified through other media of communication. The media used for any specific situations, groups of users or types of information need careful identification so as to achieve optimum effectiveness in communication and in achievement of national objectives.

Figure 1.3.1 shows some existing channels of disseminating information. These channels of dissemination form a series of alternative routes through the total communication system. The emphasis of this particular figure is to illustrate documentary and printed information.

Table 1.3.1. Forms of communication

Oral

One person to one person, e.g. a talk face-to-face or by phone

One person to several, e.g. a group or committee meeting

One person to many, e.g. a speech at a meeting

One person to a wide public, e.g. a radio talk

Several persons to several, e.g. group discussion, conversation

Documentary

Personal, e.g. correspondence, external and internal

published, usually printed: journals, books, pamphlets, specifications, catalogues, data compilations, graphics

unpublished or semi-published, usually duplicated reports, these, circulars, etc.

Audio-visual

Exhibitions (including the one-person-to-several type of communication)

Demonstrations -do-

Personal observation:

purposeful, e.g. tour of works

seen by chance

Films:

special showing

public showing

IV

purposeful, deliberately watched

public showing

Visual aids to oral and written communication

COMMUNICATION CHANNELS AND PROBLEMS:

The information Explosion

The crisis in scientific information is the Problem of Growth:

1. The recent rapid growth of scientific information is sometimes called the "information explosion", a term analogous to the "population explosion". The growth of this information has strained the traditional way of handling information.

2. At present the volume of scientific papers already exceeding ten million is thought to be growing by about a million a year, though some would say nearer to two million. This gross figure includes some duplication of content, though study suggests that there is much less wasteful duplication than appears at first sight.

3. The major abstracting and indexing journals weed out a good deal of duplication and also of material that has only marginal interest for scientists. This problem of growth is complicated by four factors.

   a) Much of the new research is of a cross-disciplinary nature e.g. in bio-deterioration environmental pollution. This difficulty can be met by expanding or transforming the existing specialized information services, almost all of which are cross-disciplinary in scope.

   b) Language is the second complication. Up to the last three decades the vast majority of scientists wrote in English, French or German, all of them fairly widely understood. Now, however, a rapidly increasing proportion is in Russian, Japanese and Chinese.

c) The third complication is the scattered nature of the growth in literature. Even conservative estimates put the number of current journals that are relevant to practising scientists at about 30,000. But the growth of reports and monographs has been at least as spectacular, as a result scientific literature is emanating from a vast number of varied sources.

d) Fourth complication is that there is a contrinuing, perhaps even growing uneveness of quality. Most scientists readily admit that a good deal of the literature is not worth publishing. The number of useful journals is almost certainly much smaller than the grand total of 30,000. One study has suggested that in the U.S.A. for instance, important original research is possibly limited to about 400 journals.

e) Finally, it is difficult to predict the scale and pattern of future growth.

APPROACHES TO THE PROBLEM:

1. Handling information on this scale is primarily a problem of organization of how to select from a large supply the small amount of information that each scientist or team requires, given that these requirements may cross the boundaries of disciplines and may extend beyond the language competence of the team and its supporting library.

2. One part of the problem providing physical access to literature itself has been tackled systematically in the U.K. by the creation of the National Lending Library for Science and Technology.

3. Access to translations has been much inforced by the cover-to-cover translations of important journals, by the creation of indexes to translations, by the improvement of translating facilities and by the development of skill with language as part of the training of information specialists.

4. Another approach is to publish journals containing longer summaries, or letters, which include information on the purpose, methodology, and result of research and leave out experimental detail which can be deposited cnetrally. It is clear that the primary journal with all its disadvantages is greatly valued by scientists and not easily replaced.

5. For scientists, scientific literature outside the core journals is of little value and they can keep pace with these journals by either browsing through them or by scanning contents pages reproduced in the Institute of Scientific Information.

Current Contents:

An urgent need for better means of handling the literature, two main courses of action have been explored.

1. To extend and develop the concept of an information analysis centre, in which literature of a narrow subject field is carefully evaluated and only items of sufficient quality and relevance are presented to users.

2. To harness modern information technology, computers, telecommunications, microreprography etc., in order to select and reproduce items that are relevant, leaving users themselves to make any selection on the basis of quality. These two courses represent two distinct approaches to the sorting and selection of information. The first lays stress on the content of literature, the information that it conveys. The

second concentrates on the medium by which the information is conveyed.

COPING WITH THE CRISIS: HARNESSING TECHNOLOGICAL PROGRESS-COMPUTERS

1. The value of computers to scientific information processing lies chiefly in their ability to store a large quantity of information and to handle and retrieve it with great speed and flexibility.

2. Information (whether it is bibliographical reference to a text or the text itself) has to be first identified and then analysed intellectually and categorized. Once this preliminary work has been done, however, the information can be put into a computer system, stored as a data base, and when needed, rapidly sorted for presentation in a variety of ways. The simplest of the computer-based systems holds only bibliographical references with a few descriptors. Others includes a more extensive range of descriptors or complete abstracts.

OUTPUT

Include:

a) Computer controlled typesetting of primary and secondary journals
b) The production of indexes for these journals
c) Selective dissemination of information
d) Retrospective searching
e) Preparation of specialised bibliographies and data compilations.

The first major operational system of this type was launched by the National Library of Medicine in the U.S.A. in 1964, known as MEDLARS (Medical Literature Analysis Retrieval System). It started from index medicus, the most important indexing system for

medical literature, which aims to cover all publications in Medical Sciences and related subjects and which in doing so indexes about one-tenth of the world's total scientific and technical literature. The computer output of MEDLARS was intended first to provide copy for the composition of index Medicus, but the massive information file so generated was also designed for retrieval purposes and has been used widely for retrospective searching, selective dissemination, and the production of selective bibliographies on such topics as toxicology and nursing. Now nearly a decade old, the MEDLARS data base contains about 2 million references and over 200,000 are added each year.

Also in the early 1960's Chemical Titles appeared as the first product of an elaborate computer-based system that has been under continuous development by the chemical Abstract Service in the U.S.A. This system now includes abstracts, bibliographic information and important data relating to the chemical compounds and it provides a very wide variety of publications.

There are probably more than 100 English language mechanized information retrieval systems of different sizes, scope and function. Many of these are based on traditional information services in the U.S.A. or the U.K., but some are entirely new creations and a few, notably that developed by the International Atomic Energy Agency in Vienna, are truly international in organization and input, as well as in use. In some countries, especially France, the U.S.S.R. and Japan, computer systems are being based on comprehensive national systems for abstracting and indexing. Computers are also being used experimentally and operationally in order to improve library operations, especially those associated with catalogue records and loan records. The MARC System has been developed by the USA library of Congress in association with other national organizations, notably the British National Bibliography, and has been used with local

modifications, right across the world.

Until recently the major computing facilities for information retrieval have been held for economic reasons, until there are sufficient of them to put to the computer as a single batch and the enquirers have to wait for days and even weeks, before receiving their answers. In the last few years, however, the application of on-line systems has been increasingly explored. In such systems the user has direct access to the computer by means of a local terminal (Keyword, with or without visual display unit) and can interrogate the computer store and obtain an immediate response. Because he can also interest ("converse") with the computer while his inquiry is being processed, he can amend his request as a result of the dialogue he has with the system.

THEORETICALLY:

On-line systems have many advantages over batch-processing systems; notably the speed with which they can supply answers to enquiries and the case with which they can help a user to define his requirements, precisely.

They correspond much more closely to the techniques traditionally employed by users in manual searching and so have a psychological advantage. However, they have encountered two major problems:

a) On-line facilities are more expensive than batch-processing systems in terms of both equipment and running costs. A user organization has to acquire a terminal, pay for a connection to the computer, and on most occasions, use the computer for much longer time periods. Thus both suppliers and users have to balance the greater cost of these on-line facilities with the value of greater

speed and efficiency. However, the cost of computers is falling and gradually will become a minor component of information retrieval.

b) There is also a problem that computerized information systems have to be approached in a formulized structured manner. The on-line user has to know the language of the system and the methods of interrogating the data base. In some systems this task is facilitated by issuing a mannual for users, in others by building in a "dialogue" programme which helps the user formulate his questions correctly. No one disputes the inherent advantages of computers and few days that they will have an important part to play in controlling the rising tide of information.

TELECOMMUNICATIONS:

In telecommunications, facilities can be made abundant, efficient, reliable and cheap, both within and between countries, it becomes possible to link in a planned network which enables efficent switching between systems, all the computers in a geographical area that process and store any kind of information and to put all types of users in touch with any of these computers through their local terminals. Several problems to be overcome before scientific information services can reap the full the full benefits of networking.

a) There is a need to improve the telecommunications software upon which will depend the links between computers and terminals on the one hand and the transmission facilities on the other.

b) In particular, there is scope for reducing, through efficient design of hardware and software the amount of time spent

in interaction between computer and user.

Secondly there is a need to plan the scale of high capacity networks on a careful anticipation of use and then to build up use quickly so as to spread the high cost of investment and keep the cost of services to individual users low.

MICROREPROGRAPHICS

This is the third major area in which technological advantage have been applied to information problems. This can improve the methods of handling the literature itself, merely not references to the literature or abstracts from it. By microreprographic processes documents of all kinds can be reduced to more convenient forms that take pu less storage space and are more easily handled than the originals.

DISADVANTAGES OF MICROFILMS

1. Many users find them unacceptable. COM: This is a relatively new application of microfilm technology. The use of COM (Computer output microfilm) techniques to print out information direct from the computer on to microfilm or microfiche, instead of paper, each frame representing a page of computer print out. COM offers a means of reducing the vast amount of paper print-out which often results from computer searches, and it also provides output more rapidly than conventional inpact printing. COM techniques are therefore particularly attractive where large collections of data are handled e.g. bibliographical data in library catalogues and numerical data from scientific experiments. They also have application little-used data from computers which is expensive when stored on magnetic tapes but much cheaper in microform.

Because of rising demand on postal services alternative systems of transmitting documents have been widely investigated in recent years mainly using the method known as facsmile transmission. Such systems consist of transmitters and receivers, usually by existing telephone lines, mostly as paper copy but sometimes as images on a video-screen.

Information and its users

The first characteristic to be noted about users is that the number of those who have need of information far exceeds those who actually use information. The first stage in communication policy implementation therefore is to create an awareness of information, its value, sources, accessibility and acquisition.

In general, the kind of information sources sought and used tend to be those easy of access and known personally to the user, regardless of the quality of the information. Information may be sought for a particular purpose in particular circumstances, or collected in advance because it is likely to be useful. It is of maximum use when it matches a need which is highly specific. For example, the need may be not just for "information about corrosion", but "information about corrosion at bimetallic joints exposed to a tropical marine environment; by midday tomorrow, not just anytime; a review of practice, not a treatise on electrochemistry; in English, and short enough to be read in an hour.

The working habits of the individual needing information, the importance placed on getting it, the facilities available for seeking it, the knowledge about these facilities, the judgement of their value, the estimate of the probability of getting what is wanted - all of these factors may affect information-seeking behaviour. Unless a person who wants information is fairly sure of getting it without much trouble, he is apt to do without it if

it is not essential. Replying on memory, skirting around the issue or making do with incomplete or vague information from a colleague are not unusual behaviour traits. There is, however, a small group of users who actively seek information spending effort and resources to acquire pertinent information and these users in fact are the most progressive in economic activity. For them, confidence in the credibility of an information service is a main condition for full use of it, secondary only to convenience factors such as accessibility and ease of use.

From a user's point of view there is no distinction between scientific information and technical information. The results of a research programme on a particular catalytic reaction may be of as much immediate usefulness to a chemical engineer as a manufacturer's literature on plant equipment.

The differences between users tend to be related to where they work in the chain of scientific discovery, technological innovation and adoption or diffusion of innovation. The following list illustrates one view of this situation, which results from studies already made:

a) In technology, including application of science and engineering, creative efforts are primarily concerned with the integrating of previously existing knowledge to produce usable commodities and services, including, for example, systems devices, processeses, methods and materials.

b) Pure research and phenomenon-oriented research is concerned mainly with the generation of knowledge about some phenomenon or other.

c) The knowledge generated from pure research and phenomenon-oriented research is made available to the scientist and technologists in several ways and through several channels.

d) Technological events are usually initiated within technology, in the presence of an ambient science. With a few exceptions, it is usually difficult to establish a unique correlation between an important technological advance with a piece of knowledge generated by pure research phenomenon-oriented research feeds upon knowledge generated in the field of pure research and phenomenon-oriented research. However, there are several interconnections across the two spheres of activity.

A major difficulty for many industrialized countries is that information users in the pure and phenomenon-oriented research sectors tend to have a communication circuit, both personal and documentary, which excludes interaction with other sectors. The communication linkages between sectors have to be developed. This situation is one that developing countries will want to avoid.

Kinds of information sought and services used

The user can first seek information by:

1. going to a library for an identified document, or
2. making an enquiry of an information service, or
3. asking a colleague or other acquaintance.

The third approach may lead to an enquiry to an information service which may lead to a request for a document. Where an extension or dynamic information service exists, it can identify the need, find the information and deliver it in some suitable form without the user making more than a passive initiative.

The totality of services provided by libraries and other information services is made up of several different types of services to meet demands for the provision of specific documents identified and named by the user; the provision of documents which the user does not specify or identify individually; and of information analysis service, can be of a nature that assumes a demand before it is voiced, thereby requiring the staff of such an information service to take a very active role in information gathering and disseminating.

The value of information

Some benefits likely to result from a larger availability of scientific and technical information can be cited:

a) Improved capability of a country to take advantage of existing knowledge and "know-how" achieved elsewhere.

b) Rationalization and systematization of a country's research and development efforts in light of knowledge already available.

c) Wider knowledge base for the solution of problems.

d) New alternatives and approaches to the solution of technical problems, and options for minimizing future ones.

e) Improved effectiveness and efficiency of technical activities in the production and service sectors.

f) Above all better decision-making in all sectors and at all levels of responsibility.

More specifically one economist, D. Lamberton, has said "in a world..... where the firm is obliged to make unique and crucial decisions to optimize and to innovate, the making of such devisions puts a premium on information; its acuisition, storage and utilization become a major business activity". National economic growth is the sum of the growth

of each and all economic units within the state. The contribution of information to national welfare cannot any longer be doubted, but the quantification of this contribution is extremely difficult. It is equally difficult to define the optimum level of resources which should be devoted to the information input at either local, company or national level.

Strengthening national information systems increases the flow of information available for the final users, both from foreign and national sources. In developing countries, information services serving the interests of small and medium entrepreneurs have already demonstrated their efficiency. For example, from 1960 to 1970, the work of the Rubber Research Institute in Malaysia led to 100% rise of rubber yields in Malaysian small holdings and the work of the International Rice Research Institute led to a 30% rise of rice yields in the philippines. Comparable countries in the region, without the same information sub-systems, hardly moved at all during the same period.

Sound management of national information systems can provide information to the user at a lower cost. It is usually recognized that highly educated professionals (i.e. users) spend around 20% of their time looking for information. Approximately twenty developing countries each have over 100,000 such professionals. The total time spent by 100,000 professionals searching for information is approximately 50 million hours per year.

The management of national information systems provides other advantages, such as shortening the delays between question and answer, enabling potential users to start using information, and liberating

the country from excessive dependence on foreign-managed technology. Scientific and technical information is increasingly recognized as valuable by those concerned with the development process worldwide. The United Nations' World Plan of Action for the Application of Science and Technology to Development expresses the following sentiments: "A country without an indigenous scientific and technological capacity has no means of being aware of its own needs, nor of the opportunities existing in science and technology elsewhere, nor of the suitability of what is available for its own needs".

The Second United Nations Development Decade should provide for a systematic and adequately supported effort to improve the facilities and arrangements for the transfer of existing knowledge and technology from developed countries to less developed ones. Developing countries require scientific and technical information systems of their own, suited to the type, capacities, and location of the producers and users of such information and giving emphasis to the type of knowledge most needed for economic and social development. Such internal systems must be effectively connnected with the information network of the highly developed countries.

Barriers to access to information

Access to precise and reliable information - scientific, technological, commercial and managerial - at the right time, to the right person in a form most conveniently usable by him, can help to minimize the wastage of resources due to unnecessary and unintended reinvention, rediscovery, redevelopment, and above all the making of unfruitful decisions which result in wasted resources. A decision is generally

no better than information to which the decision-maker has access. The availability of the right type of information can trigger new directions in research, development, and managerial action. Any barriers to the access of information will prevent proper communication and information flow, causing problems for the user.

The challenge of overcoming, or minimizing, such barriers lies within the purview of the true information professional. Table 1.3.5. itemizes some difficulties in obtaining information and the information services which can overcome these difficulties. Kabesh has commented on several "actual situations" which exist in developing countries and which have great impact on the information systems and services there.

Actual Situation No.1: Lack of Government Recognition

Managements and governments have often failed to appreciate the importance of information in the pattern of modern economic progress. It has been suggested that one reason for this is that managers and officials sometimes fear their own secrets will be lost in the process of gathering information. This may be caused by ignorance of what information services can do, and ignorance of the value of information to a particular organization. It may be because of traditionalism - what my father did is good enough for me, so why should we bother to change - coupled with a real fear of progress and forced change. Or it may be just a matter of laziness in facing up to the needs of the age.

As governments have started to establish national science policies, questions associated with the allocation of funds and equipment and with the development of scientific man-power have started to become familiar, if not resolved. In most cases the organization of information resources for science and technology has been either ignored or given less attention.

Actual Situation No.3: The Language Barriers

Science is universal, the vehicle of scientific and technical information is not universal, but made up of different language that are unevenly distributed throughout the world. Each linguistic community forms in fact a kind of island, in which only a few scientists can communicate with more than one or two other linguistic groups. This hindrance to the flow of scientific knowledge is enormous.

The natural solution is to improve the ability of scientists to read other languages so as not to need translations or at least to reduce the demand to a minimum. But such a policy needs support from an improved supply of translations. In 1947, the Special Libraries Association (USA) established a centre to exchange and lend unpublished translations. This service is housed at the John Crerar Library in Chicago, which acts as depository and provides information about recources. Similar centres exist in other developed countries.

The European Translations Centre, in Delft (Netherlands), which came into being in 1961 with the co-operation of fourteen European countries, the USA and Canada, is a clearinghouse for scientific and technical translations prepared throughout the world from languages that these countries consider "difficult" into more accessible Western languages, the objectives being to facilitate the use of literature of interest to science and industry.

Actual situation No.4: Ignorance

The biggest obstacle to increasing the communication of scientific information is ignorance of, and inability to use, the opportunities offered by information services. Science itself and the system for disseminating scientific knowledge have been taking on a mass scale - one could say, industrial, nature; but the attitude of

Actual Situation No.2: Currency Exchange and Import Controls

The acquisition of scientific and technical information from abroad, in printed and other forms, and under licence of knowhow agreements, is often hampered by:

a) currency exchange

b) import controls

c) mailing tariffs (postal rates), and

d) communication rates related to distance.

In some countries, individuals or institutions have difficult in obtaining convertible currency at all; in many others, the time and effort involved to obtain convertible currency serves as an effective deterrent. The purchase-coupon scheme established by a donor country or agency can provide a way round this barrier. Clearly, the most effective approach is for countries to recognize the value of information to society and to relieve their exchange controls. The articulation of a national policy on information would go a long way toward solving the problem.

Another impediment to the acquisition of printed publications and other information services from abroad is caused by the import restrictions imposed by some countries. To cite a recent case, a U.S. publisher was unable to lend a multi-volume set of indices to a medical library in Columbia for evoluation before purchase because the institution could not obtain an import licence for this purpose.

Countries seeking to avail themselves of information assistance should be persuaded to liberalize foreign exchange, import controls, mailing tariffs, and communication rates hampering information transfer.

scientists to use of scientific information often reflects earlier stages of the development of science when the seeking and initial processing of information was not an organized social activity but the personal business of every scientist. In this context there is an obvious and urgent need for educational guides designed to increase user's general competency in searching for needed information.

There is room for extensive training of users in the requirements, techniques, and use of information transfer systems through formal courses. For those who are still learning and studying, it is easy to organize such training, but it is more difficult with people already engaged in a profession; for them on-the-job training is necessary.

1.4 TOWARD IMPROVEMENT OF INFORMATION SERVICES IN DEVELOPING COUNTRIES

The category of developing countries involves a very wide range of situations and needs. A national survey of the existing structure and systems will be of considerable importance in the improvement of systems design. These existing services provide the foundation for any additional activity and, properly "inventoried", not only help identify gaps and deficiencies, but also indicate possible short and long-term solutions.

The design of a national information system is of necessity dependent on how far an infrastructure exists. There needs to be evaluation not only of elements which can be surveyed and measured like the quality and quantity of personnel, the resources of finance, the document holdings and their location and organisation, the availability of hardware and software, and individual and co-operative arrangements. Some estimate needs to be made of the population of users and their potential interface with the system, and even more difficult of the attitude of management, of potential financial and physical resources, and of such invisible factors as prestige and goodwill. In determining the requirements of a given developing country and the possibility of meeting them, it is essential to start from conditions in that country.

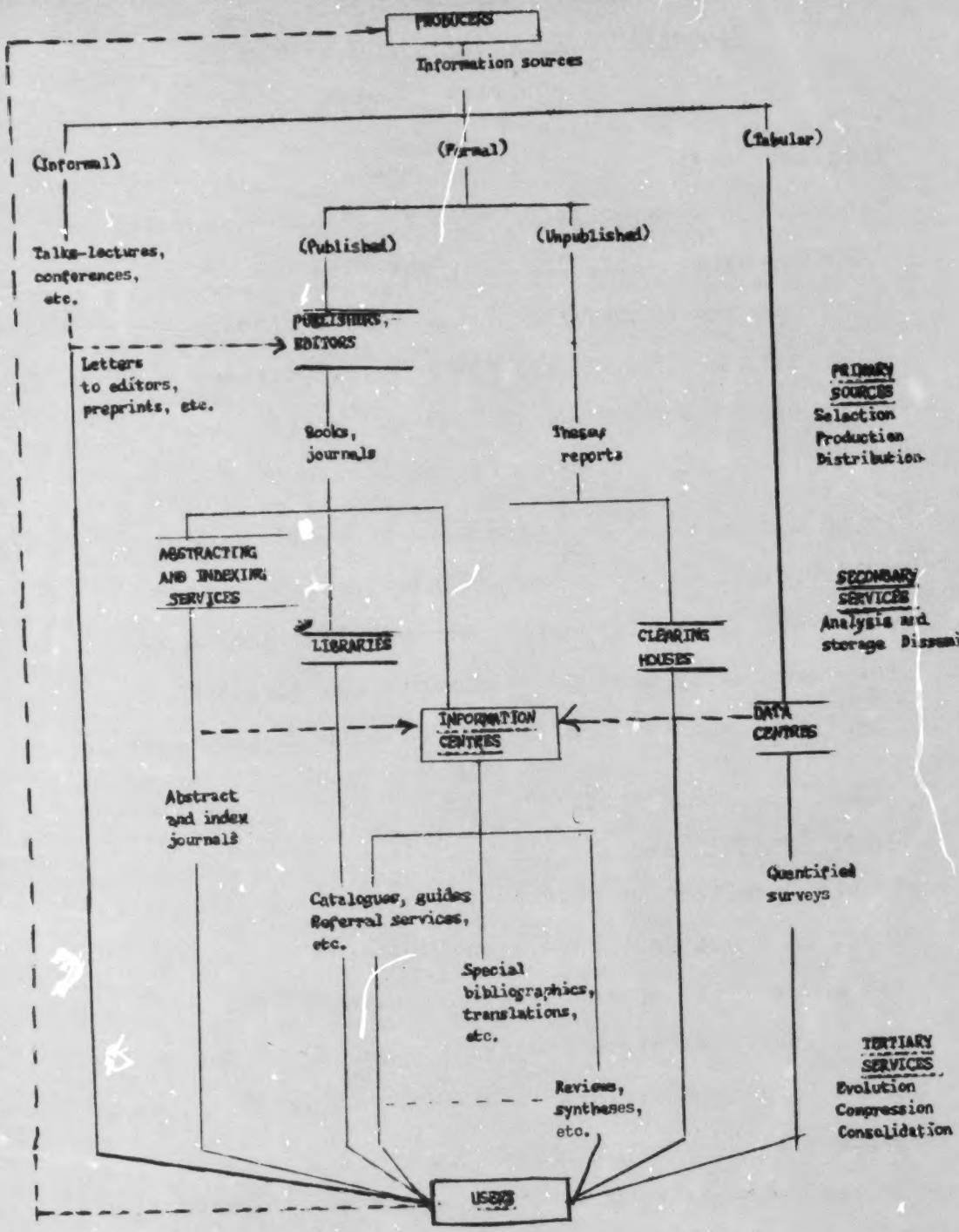


Figure 1.3.1. Some channels for disseminating information

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Information Analysis:

Classification Systems and Thesaurus

By - Ulrich Gehrke

Information Analysis is a continuation of the formal/ bibliographic description of a document. According to UNESCO - terminology document analysis

> "is the expression of document content in form different from the original through operations such as indexing, abstracting translating, reviewing, avaluating etc".

It should be noted that there is no mention of "Classification". In fact, classification systems were devised for libraries, for shelf arrangement. They are hardly used for documentation purposes. Therefore, they will be mentioned only in passing.

Classification Systems:

Dewey Decimal Classification

It was developed by Melvil Dewey, first published in 1876, many editions have been published since then. The whole field of knowledge has been divided into 10 classes, therefore "decimal" classification. Classes again have been divided into 10 sub-division and so on.

Library of Congress Classification

It was not developed as an intellectual projection, but empirically and pragmatically out of an existing subject arrangement. It has alpha-numerical notations (letters in the first two digits, then figures). The whole field of knowledge is divided into 21 general

classes using the alphabet, a second letter denotes the general divisions of a class. Arab figures are used for smaller sub-divisions.

The Universal Decimal Classification (UDC)

It was developed by two Belgians out of the Dewey Decimal Classification and has since been refined many times. UDC has become an international system with librarians of many countries participating in it. The H.Q. of these efforts is the FID (Federation International de Documentation) in the Hague. UDC has been translated into many languages. UDC has not been developed primarily as a book classification, but as a means of indexing for all sorts of documents, particularly from the pure sciences and technology. UDC allows for correlation of class numbers by means of punctuation symbols. This gives the system an amount of flexibility, so that it can be used for indexing.

Dewey Decimal Classification

000	General Works	500	Pure Science
100	Philosophy	600	Technology
200	Religion	700	The Arts
300	Social Sciences	800	Literature
400	Language	900	History
500	Pure Science	549	Mineralogy
510	Mathematics	550	Earth Science
520	Astronomy & Allied Sciences	560	Paleontology
530	Physics	570	Anthropology & Biology
540	Chemistry	580	Botanical Sciences
548	Chrystallography	590	Zoological Sciences

500	Pure Science
510	Mathematics
511	Arithmetic
512	Algebra
513	Geometry
513.1	Plane Geometry
513.2	Curves
513.3	Solid Geometry

Library of Congress Classification

A General Works. Polygraphy

B Philosophy. Religion

C Auxiliary Sciences of History

D Universal History

E-F American History

G Geography. Anthropology

H Social Sciences

J Political Science

K Law

L Education

M Music

N Fine Arts

P Language and Literature

Q Science

R Medicine

S Agriculture

T Technology

U Military Science

V Naval Science

Z Bibliography. Library Science

Q Science

QA Mathematics

QB Astronomy

QC Physics

QD Chemistry

QE Geology

QH Natural History

QK Botany

QL Zoology

QM Human Anatomy

QP Physiology

QR Bacteriology

Q Science

QA Mathematics

QA 101 Arithmetic

152	Algebra
445	Geometry
447	Elementary pure Geometry
501	Descriptive Geometry
529	Trigonometry
538	Analytic Geometry

The Universal Decimal Classification

669	Metallurgy
669.1	Ferrous metals
669.2/.8	Non-ferrous metals
669.3/.6	Non-precious, heavy industrial metals
669.3	Copper
669.33	Extraction from ore
669.34	Refining
669.35	Alloys
669.35'5	Copper-zinc (from 669.5 zinc)
669.35'5'781	Copper-zinc-boron (from 669.781 Boron)
669.35'5'781'884	Copper-zinc-boron-lithium (from 669.884 Lithium)
669.36	Fabrication, finishing
669.36:621.774	Tube manufacture
669.37	Applications
669.37:69.024	Roofing
669.386/7	Coatings (of copper) or use. 058)
669.389	Coatings (on copper) or use .056.9)

Thesauri:

"Thesaurus" is a word derived from the Greek, and it means "treasure". It has then been used to denote a "treasure of words" or rather the complete collection of words of a language. This order aspect of completeness is the opposite of the modern, documentation oriented concept of a Thesaurus.

In simple words:

> A Thesaurus is a means of reducing the natural language with its abundance of possibilities of expression and description into a system language by means of terminological control (controlled vocabulary).

This system language may comprise the whole field of knowledge or only parts of it.

The essential feature of a Thesarus - compared e.g. with a dictionary - is that the thesaurus terms are not explained by defining sentences, but by term relationships.

This means that any term of the system language is placed in a network of semantic, generic and associative relations, and these relations provide some kind of definition.

Semantic control begins with the elimination of synonyms:

Vessel	Ship	one term has to be preffered,
↓	↓	
non-descriptor	descriptor	preferred term = descriptor

Descriptors should be nouns, and these nouns should be in the plural (to denote classes of things like "teeth", "sugar beets") or have a different meaning in the plural than in singular ("Wood", Woods"),

Adjectives are permitted to some extent in the form of modiffiers like "International", "Social" etc

When these adjectives are used in more or less fixed combinations with nouns like:

Social policy, international relations they should not be entered singly, as single descriptors, but as compound descritors, they should be pre-coordinated. The alternative would be to enter them as single descriptors and post-coordinate them (when indexing or retrieving):

In the Social + policy, international + relations in the DECD - macrothesaurus there are 42 componual terms between "Social adaption" ⟶ "Social Workers"

We retire to the network of term relationships.
We mentioned the elimination of synonyms:

Vessel ⟶ Ship
Alteration ⟶ change

These are equivalence relations, since - hierarchically speaking - the operation takes place on the same level, the terms are on the same level:

Ship UF vessel

UF	= Used for
U	= Use

Hierarchical relations in the proper sense exist when term relations are expressed by super - or subordination (also called "generic relations")

BT crops
industrial crops
NT oil crops

BT industrial crops
oil crops
NT oil palms)
oil seeds) on the same level!
olives)

BT	= broader term
NT	= narrower term

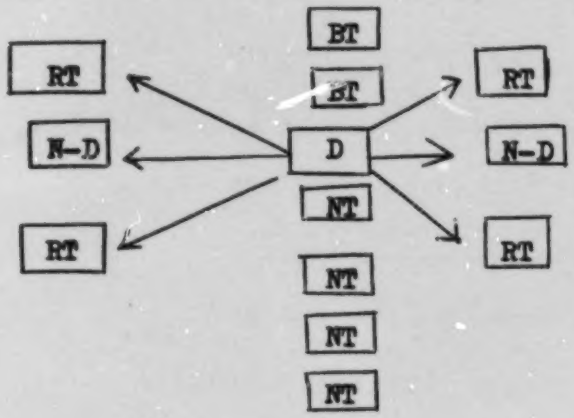
There is still another form of relationship: <u>associative relations</u>. They denote term relations that are neither consistently hierarchical nor equivalent:

<u>related terms</u>:

industrial crops — oil crops — RT = related terms

RT agroindustry — RT vegetable oils

Basic model of network of relationships:



The meaning of a Thesaurus term (its conceptial content) is mainly defined by its relationships to other terms. <u>Should there be doubt</u>, a definition may be added:

Scope Note (SN)

Abbreviations and acronyms are only admitted when their meaning is well established:

OECD, Radar

Sample from OECD - Macrothesauris:

INDUSTRIAL CROPS

CULTURES INDUSTRIELLES/CULTIVOS INDUSTRIALES

07.07.02

SN: REFERS TO CROPS GROWN ON A LARGE SCALE AND PROCESSED WITH MECHANICAL EQUIPMENT.

UF: CASH CROPS

BT: CROPS

NT: COCOA

COCONUTS

COFFEE

COTTON

FLAX

HEVEAS

OIL CROPS

OPIUM

SUGAR BEETS

SUGAR CANE

TEA

TOBACCO

RT: AGROINDUSTRY

With a view to assisting the ruderer to find the proper descriptor, descriptors (and nondescriptors) have been arranged under various aspects: alphabetic, the thematic, hierarchical and permuted. Most Thesauric comprise the following parts:

Complete alphabetical listing

thematic listing

hierarchical display (and facetted display)

Permuted listing (KWIC or KWOC)

Macrothesaurus

Alphabetical Thesaurus (complete alphabetical listing)

Descriptor Group Display (thematic listing)

a) Subject Category Fields (19)

b) Descriptor Groups

Hierarchical Display (hierarchical display)

KWOC Index (Permuted listing)

SPINES - Thesaurus

Alphabetical Structured List (complete alphabetical Listing)

Terminological Graphic Displays

Global Graph of Graphic Displays (facetted display)

UNESCO - Thesaurus

Classified Thesaurus (thematic listing)

Alphabetical Thesaurus (complete alphabetical listing)

Permuted Index (KWIC) (Permuted listing)

Broad System of Ordering

First Outline)
Second Outline) thematic display

Full Schedule (classification)

INDOCHINA (CONT)

NT: KAMPUCHEA

LAO PDR

VIETNAM

INDONESIA

INDONESIE/INDONESIA - 01.04.04

BT: SOUTH EAST ASIA

RT: INDONESIA

INDONESIA

INDONESIEN/INDONESIO - 14.03.02

RT: INDONESIA

INDUCED MUTATIONS

MUTATIONS PROVOQUEES/MUTACIONES PROVOCADS

15.02.03

BT: MUSTATIONS

INDUSTRIAL ADAPTATION

ADAPTATION INDUSTRIELLE/ADAPTACION INDUSTRIAL

- 08.01.02

SN: ADAPTATION OF A COUNTRY'S INDUSTRIAL STRUCTURE TO CONDITIONS OF INTERNATIONAL COMPETITION

BT: ADAPTATION

RT: INDUSTRIAL STRUCTURE

INDUSTRY

INDUSTRIAL ADMINISTRATION

ADMINISTRATION INDUSTRIELLE/ADMINISTRACION

INDUSTRIAL - 04.03.02

SN: AT THE GOVERNMENT LEVEL. DO NOT CONFUSE WITH

'INDUSTRIAL MANAGEMENT'

BT: ECONOMIC ADMINISTRATION

RT: INDUSTRIAL PLANNING

INDUSTRIAL POLICY

INDUSTRIAL AREAS

ZONES INDUSTRIELLES/ZONAS INDUSTRIALES

0.8.02.03

SN: AREAS WITH A RELATIVELY HIGH INDUSTRIAL CONCENTRATION, EITHER PLANNED OR UNPLANNED.

RT: INDUSTRIAL CONCENTRATION

INDUSTRY

INDUSTRIAL ASPECTS

ASPECTS INDUSTRIELS/ASPECTOS INDUSTRIALES

08.01.01

RT: INDUSTRY

INDUSTRIAL BANKS

BANQUES INDUSTRIELLES/BANCOS INDUSTRIALES

08.02.04

BT: BANKS

RT: DEVELOPMENT BANKS

INDUSTRIAL CREDIT

INDUSTRIAL BUILDINGS

BATMENTS INDUSTRIELS/CONTRUCCIONES INDUSTRIALES - 08.03.00

BT: BUILDINGS

RT: INDUSTRIAL PLANTS

INDUSTRIAL CAPITAL

CAPITAL INDUSTRIEL/CAPITAL INDUSTRIAL

08.02.04

SN: INVESTED AND WORKING CAPITAL OF THE INDUSTRIAL SECTOR.

BT: CAPITAL

RT: INDUSTRIAL INVESTMENTS

WORKING CAPITAL

INDUSTRIAL CENSUSES

RECENSEMENTS INDUSTRIESL/CENSOS INDUSTRIALES

08.01.01

BT: CENSUSES

INDUSTRIAL CONCENTRATION

CONCENTRATION INDUSTRIELLE/CONCENTRATION INDUSTRIAL - 08.02.03.

SN: IN THE GEOGRAPHICAL SENSE, CONCENTRATED IN ONE AREA.

BT: ECONOMIC CONCENTRATION

RT: INDUSTRIAL AREAS

INDUSTRY

INDUSTRIAL CREDIT

CREDIT INDUSTRIEL/CREDITO INDUSTRIAL

08.02.04

BT: CREDIT

RT: INDUSTRIAL BANKS

INDUSTRY

INDUSTRIAL CROPS

CULTURES INDUSTRIELLES/CULTIVOS INDUSTRIALES

07.07.02

SN: REFERS TO CROPS GROWN ON A LARGE SCALE AND PROCESSED WITH MECHANICAL EQUIPMENT.

UF: CASH CROPS

BT: CROPS

NT: COCOA

COCONUTS

COFFEE

COTTON

FLAX

HEVEAS

OIL CROPS

OPIUM

NT: SUGAR BEETS

SUGAR CANE

TEA

TOBACCO

RT: AGROINDUSTRY

INDUSTRIAL DESIGN

ESTHETIQUE INDUSTRIELLE/DESENO INDUSTRIAL

08.03.00

BT: ENGINEERING DESIGN

INDUSTRIAL DEVELOPMENT

DEVELOPMENT INDUSTRIEL/DESARROLLO INDUSTRIAL

08.01.02

UF: INDUSTRIAL GROWTH

BT: ECONOMIC DEVELOPMENT

RT: INDUSTRIAL PROMOTION

INDUSTRY

UNIDO

NATURAL SCIENCES (CONT)
.SPACE SCIENCE
..ASTRONAUTICS
..ASTRONOMY
.ZOOLOGY
..ENTOMOLOGY

NATURE CONSERVATION
.ANIMAL PROTECTION
..FISHERY CONSERVATION
..GAME PROTECTION
.ENVIRONMENTAL PROTECTION
..LANDSCAPE PROTECTION
..POLLUTION CONTROL
...DECONTAMINATION
...POLLUTER PRINCIPLE
...WARNING DEVICES
.PLANT PROTECTION
..FOREST CONSERVATION

NUTRIENTS
.PROTEINS
..AMINO ACIDS
. VITAMINS

NUTRITION
.ANIMAL NUTRITION
.HUMAN NUTRITION
.PLANT NUTRITION

OWNERSHIP (CONT)
.PRIVATE OWNERSHIP
.PUBLIC OWNERSHIP

PARAMEDICAL PERSONNEL
. BAREFOOT DOCTORS
. MIDWIVES
. NURSES
.SOCIAL WORKERS

PARENTS
. FATHER
. MOTHER

PENAL SANCTIONS
.CAPITAL PUNISHMENT
.FORCED LABOUR
.PRISONS

PENSION SCHEMES
.OLD AGE BENEFITS

PESTICIDES
. FUNGICIDES
. HERBICIDES
. INSECTICIDES

PHILOSOPHY
. AESTHETICS
. PHILOSOPHY OF EDUCATION

BEST COPY AVAILABLE

OBSERVATION

. REMOTE SENSING

OCEANIA

. AUSTRALIA

. FIJI

. NAURU

. NEW ZEALAND

. PACIFIC ISLANDS AUS

..PAPUA NEW GUINES

. PACIFIC ISLANDS FR

..FRENCH POLYNESIA

..NEW CALEDONIA

. PACIFIC ISLANDS NZ

. PACIFIC ISLANDS UK

.. NEW HEBRIDES

. PACIFIC ISLANDS USA

.. NEW HEBRIDES

. SAMOA

. TONGA

OILS AND FATS

. ANIMAL OILS

.. FISH OILS

. ESSENTIAL OILS

. FATS

.. ANIMAL FATS

. MARGARINE

. VEGETABLE OILS

. OLIVE OIL

. PALM OIL

PLANNING

. COMMUNICATION PLANNING

. DEVELOPMENT PLANNING

. ECONOMIC PLANNING

..AGRICULTURAL PLANNING

...FISHERY PLANNING

...FORESTRY PLANNING

..EXPORT PLANNING

..INDUSTRIAL PLANNING

..MANPOWER PLANNING

..MARKET PLANNING

..PRODUCTION PLANNING

.EDUCATIONAL PLANNING

. FOOD PLANNING

. HEALTH PLANNING

. NATIONAL PLANNING

. PROGRAMME PLANNING

. REGIONAL PLANNING

. RURAL PLANNING

. SOCIAL PLANNING

. TRANSPORT PLANNING

. URBAN PLANNING

..ZONING

PLANNING SYSTEMS

. DIRECTIVE PLANNING

. SECTORAL PLANNING

. STRATEGIC PLANNING

OWNERSHIP

. COLLECTIVE OWNERSHIP

. FOREIGN OWNERSHIP

.. FOREIGN CAPITAL

. LAND OWNERSHIP

PLANTS

. AQUATIC PLANTS

..ALGAE

. FLOWERS

. FUNGI

. GRASSES

. LEGUMINOSAE

. BEANS

Case Study - Indexing. by U. Gehrke.

Grouping related description by connecting them with the help of punctuation symbols.

The descriptors of the subject-matter index and the geographical index correspond with those in the "Thesaurus for wirtschaftliche and soziale Entwicklung". The symbols for the subject-matter and geographical discriptors have the following meaning:

* indicates geographical descriptor;

/ links geographical descriptor (s) with relevant subject-matter descriptor (s);

\+ indicates sequence of nonrelated descriptors, any one of which may be combined with each descriptor on the opposite side of the diagonal stroke /;

: permutes descriptors;

, combines two or more descriptors to form a new descriptor;

; separates a unit of geographical and subject-matter descriptors from succeeding units.

* Tanzania/Technical Assistance: *Sweden + Information Systems, Planning + Technology Transfer: Industrial Sector + Development Policy.

Geographical Index:

Sweden

Tanzania: Technical Assistance

Technical Assistance: Tanzania

Tanzania

Development Policy

Industrial Sector: Technology Transfer

Information Systems, Planning

Sweden: Technical Assistance

Technical Assistance: Sweden

Technology Transfer: Industrial Sector

Subject Index:

Development Policy

Tanzania

Industrial Sector: Technology Transfer

Tanzania

Technical Assistance: Sweden

Tanzania

Technology Transfer: Industrial Sector

01. The Development of a national orthography in Somalia and the modenlization of the Somali language

* Somalia/Linguistics + Official Language, Script

02. Decentralization and the organization of space in Tanzania

* Tanzania/Urban Planning: Capital Town + Decentralization + Rural Development: Ujamaa

03. Political stability as a basis for another development in Uganda.

* Uganda/Socio-Economic Change

+ Social stratification: Anthropology Development Policy

+ Foreign influence

04. The black press in Southern Africa and Lesotho
*South African Republic/Bibliography: Press + African, Press + Indian, Press;
* Lesotho/Bibliography: Press

05. A reassessment of the Ethiopian - Somali conflict
+ Territorial Claim + Relations: *USSR

06. The East African sugar industry
*East Africa/Sugar Industry, Development Planning +Rural Development + Foreign Trade, Sugar;
*Tanzania + *Kenya/Sugar Industry

07. Aspects of agro-pastoralism in East Africa
*Kenya + * Tanzania/Agriculture: Cattle Production + Nomads, Cattle Production: Ecology

08. The promotion of Suzerainty between sedentary and nomadic populations in Eastern Ethiopia

09. *Ethiopia/Socio-Political Change: Nomads + Social Stratification: Nomads

10. Organisation of a Production Workshop for the Disabled
*Ethiopia/Social Assistance: ILO + Rehabilitation, disability

11. Zambia's foreign policy
*Zambia/Foreign Policy + Diplomacy +Non-Alignment + Foreign Relations: *Angola +Military Aid: *Great Britain;
*Southern Africa/National Liberation Movements.

THE ROLE OF INFORMATION IN DECISION MAKING

By - M. Shio.

Introduction

In formation is a fundamental resource of organizations, countries and for the whole World. It is so essential to the operations and management of an organization that it is often referred to as the "life blood of the organization on the fabric of an organization". Managers need information to define goals and to guide the operations of the organization so as to bring about the effective and harmonious achievement of these goals. Managers use information to formulate plans, to communicate the plans to subordinates, to coordinate the eventual execution of plans and to establish whether the execution is proceeding satisfactorily. Managers need continual flow of information about their customers, their suppliers and the environment in order to redefine goals, and alter plans when a shift in the environment makes such action necessary.

One of the major roles of a manager is processing information and making decisions. Information Systems can very much help in this process. Before we can understand the role of information in decision making we must first explore decision making in more depth to see how we can set up a system to support it.

Problem Finding and Solving

Before a decision can be made, a manager must be aware of a problem. A problem exists when the decision

makers ideal situation differs from reality, for example, when profits are below expectations. Any good manager must try to do something in order to arrest the situation after noting that a problem exists, a decision maker must decide what caused it.

He would want to get answers to such questions as; are Sales down or inventories up? Is advertising too low? etc, after determining the cause or causes the decision maker must work to solve the problem having to develop some approach to remedy the situation.

Stages in Decision Making

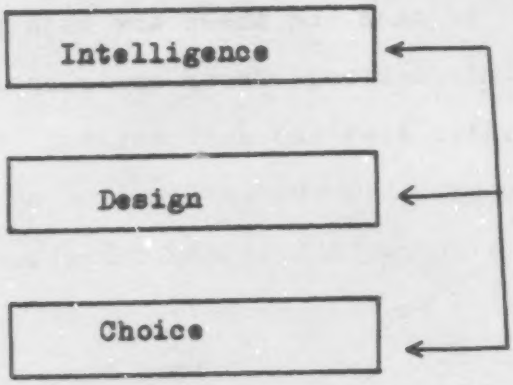
In finding and solving a problem a decision maker faces a myuad of decision cycles. What is the problem and what is the cause of the problem. What further data do we need now and how should we implement the problem solution. Each of these major steps in solving a problem involves a solution of subproblems and many decisions have to be made.

Simon has suggested a series of descriptive stages for decision making which are helpful in understanding the decision process. These consists of three major phases;

(i) Intellegence, searching the environment for conditions calling for decisions.

(ii) Design - inventing, developing and analysing possible courses of action. This involves processes to understand the problem to generate solutions and to test solutions for feasibility.

(iii) Choice selecting a particular course of action from those available. A choice is made and implemented.



Flowchart of the Decision process.

Types of Decisions

Three types of decisions are made in an organisation. Anthony (1965 offers an indepth view of these three types.

The first decision area is strategic planning in which the decision maker develops objectives and allocates resources to attain these objectives. Decisions in this category are made over a long period of time and usually involve a substantial effort and investment. For example, the development and introduction of a new product is a strategic decision.

Decisions that are classified as Managerial Control in nature deal with the use of resources in the organization and often involve financial or personnel considerations. For example, an accountant may try to determine the reason for a difference between budgeted and actual cost. In this sense he or she is solving a managerial control problem.

Operational control decisions deal with the short run which affects the day to day operations of the firm what should we produce today in the factory? What should we record for inventory?

Decisions must be made and these are made under varying degrees of information. These are classified as; conditions of certainty, risk and uncertainty. This means that a manager with all the information he needs to make a decision is going to make the decision under conditions of certainty and as the level of available information goes down then the conditions change from certainty to go as far down as complete uncertainty. The aim of any information scientist is to try to provide as much information as possible to reduce managers uncertainty in order to enable them to make better decisions.

The Role of Information

Although information is a commonly used term it is a relatively complex subject, Webster defines information as:

(i) the act or the process of informing and

(ii) that which is received or obtained through the information process. In other words information can be regarded both as a process and as the output of the process. If we view information as a process then this highlights to basic conepts; data and transformation of data into information as information Scientists our main function is to transform data into information.

The transformation process consists of a set of activities which includes

(i) Recording: Indentifying and transcribing data about events or transactions e.g. sale of a product.

(ii) Classifying: Encoding data on events or transactions by major types e.g. sales by salesman.

(iii) Calculating-adding, subtracting multiplying dividing etc.

(iv) Sorting-screening, segmenting.

(v) Summarizing-Arranging transaction data and related calculation into report format e.g.

(vi) Storing-Holding transactions information.

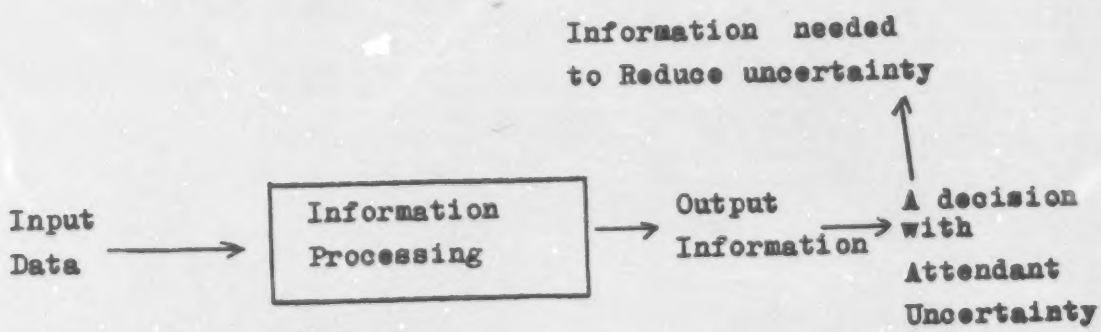
(vii) Retrieving-File searching or Scanning of stored data to perform additional calculations or to update data on the file.

(viii) Reproducing-Printing or developing reports.

(ix) Distributing-moving reports to users of information e.g. Sales manager or procurement manager.

Any information processing situation involves at least one and usually more of the above activities.

From the decision point of view we can define information as data which after transformation reduces uncertainty related to the outcome of a particular problem, event or activity. The definition is reflected in the following schematic model.



Problems associated with provision of Information for decision making..

(i) Too many users do not know what they need

(ii) We ser[illegible] too many masters each manager needs information in a different way

(iii) Consequences of the information we provide

(iv) Expensive project

ACQUISITION AND PROCESSING OF DOCUMENTARY AND OTHER SOURCES OF INFORMATION

By A. MUSANA.

OBJECTIVE

In this session we will focus mainly on the problems an information specialist or worker in a developing country, in general, is likely to experience in the process of collecting the various information resources. We will try to explore ways and means of overcoming or at least minimizing the problems. We will in passing touch on the various activities involved in the process of acquisition and processing of documents and other sources of information.

TOPICS

1. Sources of information

1.01. Documents: defined as a unit consisting of a data medium the data recorded on it and the meaning assigned to the data (1)

Included in here are monographs pamphlets; reprints; photocopies; serials.

Some document are PRIMARY in that they are original and they are not a result of a documentation process.

Others are SECONDARY i.e. they contain data or information about the primary documents. Included are: abstracting and indexing journals; title indexes etc.

1.02 Other sources include micrographics, films, records.

1.03 Individual or group of researchers in research and development of corporations are another source of information. This of course includes "invisible colleges"

2. Acquisition

This is defined the process of identifying a desired item verifying a need and selecting a source from where the item is obtainable and then ordering. Included in the process could be follow-up of order; receiving and paying for the item.

2.01 Methods of Obtaining the Information Resources.

2.011 Jobber or vendor, especially in the case of overseas purchases, who would handle all the orders including paying for them and then get paid by the client. He or she does not necessarily have to own an extensive bookshop. In the case of local documents such as government documents these would normally be available in government publications agencies. In the same way international organizations such as the United Nations, W.H.O. etc. designate certain local bookshop to be their agencies. This of course in theory eases the information workers job of foreign exchange.

2.012 Information vendor i.e. an individual or group of individuals who on obtaining the original immediately repackage and sell it to interested parties. Most of those in the business now maximise on the availability and constant improvement on computer and teletechnology.

2.013 Researchers and others in the knowledge developing industry both international and local e.g. Arusha Major Centre for Intermediate Technology.

3. Activities in the Acquisitions Process

3.01. Selection which should be a participative exercise. There is a tendency for some users to be overzealous while others are almost indifferent towards collection development. The information worker should try to balance between the two to avoid over development and underdevelopment in certain areas.

3.02 Ordering

3.03 Making temporary catalog entries.

3.04 Indentification of duplicate orders.

3.05 Preparation of claim notices for overdue orders.

3.06 Monitoring of orders to pinpoint delays.

3.07 Monitoring of funds to provide an uptodate balance.

Many of the above activities are amenable to computerization for those information utilities whose parent organizations have computer installations. In this case perhaps the utility could negotiate for a terminal on site.

4. Problems affecting the above operations

4.01 Currency Exchange

Up to now the information has depended on overseas market for their information needs. Example; learning of a change of government not from local source but from an overseas broadcasting station.

Eventually this exercise leads the information worker to asking for foreign exchange. In a world of increasing demands and contracting foreign reserves the information sector which is regarded as a Luxury by some decision makers, is likely to receive less support than other

so called more substantive or important sectors like agriculture; mining; health etc. Many a time this sector will get less than what it asked for, and, if it does get it, it is several weeks afterwards. Occasionally due to an unhealthy financial state of the parent organization even when permission is given by the Foreign Exchange Allocation Committee, in countries where this applies, the parent organization may not be in a position to instruct its banker to release the money immediately.

Consequently whatever is ordered is received later than required; if it is serials order months pass by without receiving new issues etc.

Many a time the laws of the may impose controls over importation of such resources as books and non-book informational resources.

4.02 Language Barrier

Many of our information workers are trained in either French or English or both. Whereas these are major languages for communication of information they are not all. Languages such as Russian and Chinese are neglected. The expenses of having people knowledgeable in each one of the language are immense. Fortunately, some attempts have been and are being made to establish translation centres e.g. The European Translation Centre in the Delft, Netherlands; John Crerar Library in Chicago etc.

4.03 Communication

Many a time the information are transmitted by surface mail because air freighting is too expensive. The price of this is that surface mail, depending on point of origin, may take anything up to five months to arrive.

The improvements in teletechnology would appear' to be a solution especially that, when improved the costs are reduced. However as of now it is utterly ridiculous to, for instance, receive the full text of The P. Loosjes' book On Documentation of Scientific Literature assuming that the whole of it is in a data bank some place. What one gets out of the data banks such as Lockheed's Dialogue in California using online systems, are abstracts of a resource, including full bibliographical details. This could be in printed form or on screen of CRT terminal. The organization may be interested in the hardcopy; in which case you indicate that to the system. It will be put in the post and hope that in another 3 weeks, if you are stationed in Arusha, it will arrive.

The point being made here is that the teletechnology products like the abstracting and indexing services e.g. Anbar Management Abstracts published by the British Institute of Management and Anbar Management Services; International Abstracts in Operations Research published by the International Federation of Operations Research Societies; Personnel Management Abstracts, published by the Graduate School of Business Administration,

University of Michigan, and many others are not substitutes for the original documents. They serve as guides to enable the user to carry out an evaluation of the original. In our developing regions they serve also for identification of the most recent publications in the respective fields.

4.04 Lack of Recognition by the Authority

Very many times this is regarded as a major issue or barrier in acquisition of information. It is determined by the value each authority attaches to the importance of information and several other factors. It differs from country to country and from organization. It is nonetheless an important factor. It may determine how high up in the organization chart the information facility should be placed; what part of the corporation's annual cake the information facility should receive etc.

4.05 Qualified Personnel

Lack of qualified personnel trained in documentation and information handling techniques also serves as a limiting factor in the development of information resources.

In our region this fact has been observed. Hence the mushrooming of library schools at univereities and other polytechnic and similar institutions. Further still the stress put on inclusion of information science in the curriculum.

5. Suggested Solutions

5.01 Currency Exchange

Very little can be done about this national issue by the information sector. International organizations and some other technical agencies have been helpful. Example: UNESCO National Commissions assist in providing some UNESCO coupons. The onus is of the information specialist to use his imagination to interact more with these and other organizations. Where the parent organization does a lot writing and publishing this could be another means of acquiring information resources without incurring foreign exchange directly.

5.02 Language Barrier

As pointed out earlier, there are various organisations involved in translation of foreign language Scientific technical and other kinds of literature. These services are invaluable at price of course.

It is important to have an indepth knowledge of the abstracting and indexing services in the field in which you are working. Some of them include English abstracts of articles in foreign languages. To take our field the Library and Information Science Abstracts (LISA) has such facility.

5.03 Communication

5.031 Teletechnology

Some information facilities may be at a stage when they would wish to be looked to some of the online systems such as SDC so that they can access data banks such as NTIS (National Technical Information Service).

ERIC (Educational Research Information Centres) etc. or would like to be linked on to systems such as ILO's ISIS (Integrated Set of Information Systems); UNEP'S IRS (International Referral System)

In general this requires a computer terminal with or without a CRT (Cathode Ray Tube) Screen; telephone with a coupler; a log in number provided by the vendor (this is intended to be kept secret so that other users do not use it) and an experienced online searcher. I understand that the telex system could be used. I guess it would be too expensive given that it types only about 30 characters per minute!

The developing countries I think ought to think very hard about this issue prior to taking up the service. Perhaps this is where several institutions in a particular area of knowledge could link up and repackage the information resource. The cost perhaps could be reduced for each cooperating institution.

5.032 Postal

Here perhaps the information facility could select among some of the journals and subscribe to them by air mail.

Reasonably light reports, pamphlets micrographics and photocopies could be airfreighted.

Books tend to be a problem. Only those books that are a must and are urgently required could be airfreighted, but only after it has been established that no copy of it is available anywhere in the region.

5.04 Recognition by the Authority

While the various authorities ought to realize the importance of information it is equally important that the information specialist adopts a more aggressive approach towards getting the facility more appreciated through such programmes as user education; information transfer through selective dissemination of information; Library publications e.g. Contents lists; new arrivals list; abstracting and indexing services etc.

The payoffs of strategically placing the information facility to a powerful organ of the parent organization are immense. After all, the status of any information facility is directly proportional to the support given to its efforts by top management.

6. Processing

6.01 Definition

By processing here we will mean execution of a systematic sequence of tasks or operations, not upon data, but on the sources themselves .....In the case of data from researchers and other individuals the processing would refer to the handling of the information putting it in some storage medium.

6.02 Tasks

6.021 Documents

6.0211 Checking whether the right documents have been received. These documents may have been obtained locally or from overseas. It is important that a thorough check is made because to the vendor once the items have been marked with ownership stamp its value tends to depreciate.

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6.0212 **Accessioning:** there is a need to have an inventory of the collection both for auditing purpose and making sure that duplication does not occur. There is not particular system to follow. Some information facilities might choose a serial approach from 000-treating copies of an item as being the same but differentiating it with a letter e.g.

15000A (c. 1)
B (c. 2)
C (c. 3)
D (c. 4)

6.0213 Stamping: important to put identification mark of ownership. Care should be taken to avoid overstamping to avoid sogging the item.

6.0214 Spinemarking and labelling: after the classification and cataloguing or indexing processes the spinemarking should be done. This is necessary for shelving or storage and also retrieval of the item purposes.

6.0215 Production of

6.02151 New arrivals or accessions list.

6.02152 Contents or titles lists of journals.

6.02153 Abstracting of some serials contents where this is done.

6.0216 Binding: some materials may be so flimsy that they would require reinforcement. Others may have fallen apart while in use. Some information utilities have binderies attached to them while others have to depend on commercial binderies.

Whatever is done it is important to know what has been sent for binding. This avoids complications arising out of users asking for materials that have been sent for binding.

6.0217 Weeding: occasionally it is important for an information facility to evaluate its collection in terms of currency and relevancy. Any material that seems to be dated should be relocated. In research information facilities it may be necessary to find storage for this class of materials. Once again make sure that the catalogues, indexes etc. have indications with regard to where the material is.

In general some of the above processes are susceptible to computerization. Those facilities whose parent organizations have computer installations could make use of them.

6.022 Non-documentary Information.

This includes information you obtain orally. Taking into account Ziman's paradigm regarding public knowledge such information is suspetible to doubt: it has not been exposed to public criticism.

All the same one would suggest that it is recorded and checked against authorities and processed in the same way as other documents.

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INTRODUCTION TO INFORMATION SYSTEMS AND SERVICES

by Francis Inganji:

INTRODUCTION: Information Systems and Services aid in the Scientific and technological development of a country or region.

INFORMATION SYSTEM: This is a set of discipline - Mission or function - oriented information systems, that is to say the information infrastructure, operating in a Co-ordinated way and through the use of Specified techniques of information handling: in accordance with the goals established by the National Information Policy, in order to satisfy the needs of the users at large.

INFORMATION SERVICE: This is a service rendered by an information centre, Documentation Centre or a library, to specific groups of users. Information Services include, eg. Current awareness services, Selective Dessemination of Information, Abstracting, indexing, etc.

INFORMATION SYSTEMS: Information Systems include National and International Systems. International Information System, eg. The International Nuclear Information System, and the AGRIS in the U.N. agricultural agency, FAO are examples of International Information Systems:

ORGANIZATION OF INTERNATIONAL INFORMATION SYSTEMS/SERVICES:

When you consider the creation of a world - wide System, eg. INIS, an account should be taken of all the major existing services. Such a System should be planned to incorporate

different countries' experience into the new system, so far as this seems to be promising, and not to centralize as these would be two far removed from the ultimate customer.

Standardized, decentralized input should be furnished by all the nations participanting. The carrier languages for bibliographical data and for indexing should be chosen. Also languages for the text of abstracts should also be decided upon.

One of the participating countries should be chosen to host the central processing computer, and to produce output products eg. Magnetic tapes, printed title lists, microfiches etc.

The centrally distributed output goes to the national focal points which serve their individual customers.

On the Regional level, an information network service which has been highly successful was the former East African Literature Service (EALS). The problem that faced this region was the lack of library support for research, especially in Agriculture. Well over 100 centres for agricultural research are widely Scattered throughout the Eastern Africa Region, few of them near the Capital Cities. They exist because of the area's widely varied agricultural conditions - from semi - arid to tropical rain forest. It would have been a totally unrealistic attempt to develop and maintain large libraries in each centre. The Capital costs would have been enormous and the recurring costs for journal Subscriptions alone would have made excessive claims on foreign currency reserves.

It was soon determined that the two essential requirements were current awareness and provision of copies. A way would have to be found for Scientists in even the Smallest most remote research Stations to be kept informed of what is being published and to be provided with copies of articles important to their work. A further requirement was that a system must make minimum demands on resources, both in terms of money and skilled manpower. A xerox 914 was imported and a staff member was sent to London for training in its maintenance. This was the first such Machine in East Africa). A documentation specialist was employed to help establish proper procedures and to explain the Service to prospective users. EALS began operation in February 1967, with 63 participating research Stations and educational institutions. As of June 1971, the Service was used by: 67 organizations in Kenya, 29 in Uganda, 56 in Tanzania, 9 in Malawi, 8 in Zambia, 3 in Botswana, 3 in Ethiopia 1 each in Burundi, Cameroon and Nigeria. With the break-up of the East African Community, this service has been somewhat interrupted.

Details about the former EALS operation are as follows:

a) The headquarters were located in the library of the East African Agriculture and Forestry Research Organization near Nairobi (Kenya). The library had the strongest collection in the agricultural sciences in East Africa. Also, its location makes it easy to draw on the considerable resources of the libraries in the Nairobi area.

b) Scientists in the various research stations and agricultural colleges determine the current journals which are not available locally but which are important in their work. A roster for each organisation is maintained by EALS headquarters staff. Xerox copies of contents pages of current issues are then sent automatically to the participating units. Some request content pages of a rather wide range of journals; others need only those covering the subjects in which the units specialize: tea, cotton, animal production, etc.

c) Scientists in participating units examine the contents pages and request Xerox copies of articles which seem important to their work Copies of articles in older journals are also provided on request. All copies are considered to be the property of the unit.

d) Neither the units nor the individual scientists are charged for the service. For the first three years, the direct cost of EALS was met by the Rockefeller Foundation. The East African Community took over one-third of the costs for fiscal year 1969/70, two thirds for 1970/71 and assumed the entire costs starting in fiscal year 1971/72. The East African Community was supported by the governments of Kenya, Tanzania and Uganda.

e) At the beginning of the service approximately 4,200 copies (usually representing one page each) were made and distributed each month. This figure rose

quickly as users became aware of the service and its value to them. During 1968 the total number 16,000 per month. In 1971, the figure ranged between 19,000 and 20,000 copies per month. (The Xerox 914 was replaced by a Xerox 3600 in August 1970 in order to keep up with demand).

f) The most recent figures available cover the fiscal year July 1970 to June 1971. The cost of operating the service for that period was 143,000 East African shillings. Approximately 106,000 shillings were spent for machine rental, 11,000 for postage and supplies and 26,000 for personal services. Some 228,930 Xerox copies were made and distributed during the period for a cost of 62 cents (East African) each - a little less than 10 United States cents.

The very modest operating costs noted above are due in part to local circumstances which might not exist elsewhere. Although the librarian of the East African Agriculture and Forestry Research Organization devotes much time to the service, none of his salary nor that of his staff is charged against it. Also, the organization made no charge for the use of its building or library collection. Thus a cost accountant might well consider true annual costs to be in the neighbourhood of 200,000 shillings (approximately $ 28,000). The total cost of providing literature to hundreds of scientists in over a hundred centres is less than that of developing and maintaining adequate libraries in only three or four centres.

ORGANIZATION OF NATIONAL INFORMATION SYSTEMS/SERVICES

A national information system is basically a network of existing information resources together with new services for identified gaps, so co-ordinated as to re-inforce and enhance activities of the individual units and thus enable specific categories of users to receive the information relevant to their needs and abilities. The Institutions normally involved are described below. Management of national systems implies a policy plan to define priorities, a problem-oriented co-ordination of sources and a systematic but flexible approach to information problems.

1. SUBJECT - AND MISSION-ORIENTED SYSTEMS (NETWORKS)

There can be as many subject-or mission - oriented systems (networks), Managed from one or more centres, as there are groups of users. Often the following differentiation can be made:

(a) Subject oriented - networks, can include:
scientific and technological information networks for:

Physical Sciences

Life Sciences

Technology

Inter-disciplinary areas:

(b) Socio-economic information networks for:

Behavioural Sciences.

Inter-disciplinary areas.

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(c) Mission-oriented networks. Can include orientations towards Public services: health and Medicine, transportation and Communication, defence, housing, education (including academic institutions), Socio-economic Services, other national and municipal services, Resources: Natural resources water, energy, etc.

Production: Industry, Commerce, Agriculture, etc.
Management: Management Information Systems, data processing productivity, physical and other planning, Urban and rural development and renewal, etc.

The objectives of a System or network will usually be formulated with national policy objectives and the needs of certain information user in mind.

NATIONAL NETWORKS OF LIBRARIES AND OTHER INFORMATION STORES.

Probably the most valuable fixed assets of any information system are the information stores, where most of the potentially available knowledge is collected ordered, stored and prepared for retrieval Libraries, whether academic, special or public, document repositories and other information stores are, either as individuals or grouped in networks, significant elements of any information system, existing or planned.

The following types of networks of information stores can exist:

(a) Libraries and archives: national and academic; public, including School and municipal, special, including industrial, departmental, newspaper and magazine archives; non-document libraries and archives, including films, computer programmes etc.

(b) Information Centres, holding bibliographic or other data Stores, including information analysis centres; National Information Centres, including atomic energy, market research, finance, agriculture etc; other information facilities, including industrial, managerial, commercial etc.

(c) Data Bank; General Statistics, including population, education, etc; administrative and Managerial; industrial and Commercial; agriculture; property and land; Scientific and technological, including manpower, projects and grants, financial and Statistical, property (such as laboratory equipment); specific (such as materials, structures, geology, metrology, electronics, etc).

Other Information Sources:

There are a number of Information Sources which of themselves do not belong within the Scientific and technical information network, but with which the network must be linked:

(i) Research, development and testing laboratories.

(ii) Research terms in the higher education sector.

(iii) Technical consultancy firms.

(iv) Expert personnel in government and other agencies.

The network must be linked to these so that:

Results from national research programmes can be published and disseminated by various methods including simplified restatement;

The expert knowledge of personnel in these activities can be brought to the attention of specific users (eg. through Inventories of research projects or of consultants).

LINKAGE MECHANISMS:

Libraries, data and document stores, research staff in universities, most of these and other sources of information will remain relatively unused by the large majority of potential users unless mechanisms are developed to make users aware of the sources, to identify and define user needs and make the contact between the user need and the information source. Mechanisms may include:

(a) Semi-popular: periodicals or bulletins addressed to general or specialist audiences bringing information and information sources to the attention of a wide audience on a continuing basis.

(b) Use of public Media - radio, TV, newspapers - in conjunction with group activities nationally organized.

(c) Conferences and courses: to bring a package of information to a group of specific users and to introduce these users to experts in the specific area.

(d) Extension Services:- Organized use of informal personal contacts transfer information (especially "best practice") and to define specific user needs; they occur most widely in agriculture, but active industrial services have been developed in a small number of countries.

(e) Liaison Services: the extension Service concept is now being applied in a new way, by appointment (eg. in Ireland) of Industrial liaison officers in universities to promote contact between industry and university research and expertise.

The most effective mechanism is personal contact, but it can only work to real effect when it is operating within a deliberate infrastructure of linkages. Above all, it should be able to develop confidence in the user to acquire and apply information, by being able to assure delivery of the relevant packages of information from the various information centres.

These centres must themselves, in order to perform credibly, be well funded and staffed with a high level of professional capability in their defined areas.

EXAMPLE OF A NATIONAL INFORMATION SYSTEM/SERVICE

On the national level, the network development in Mexico is of special interest. In a 1974 report by Molino, the plan developed by El Consejo Nacional de Ciencia y Tecnologie (CONACYT), the National Council for Science and Technology is described in detail. Extracts from it highlight configuration and functional decisions.

CONACYT is a federal agency set up in 1970, to create and implement a national service for scientific information and documentation. The motication behind this move was that by 1972 Mexico has only one book for each eight inhabitants; one professional librarian to assist forty libraries. Also, 67% of the existing books were located in 21% of the libraries and most of them were found in Mexico City or in the large cities of the interior.

After comparative studies on several plans for national information systems plans, one was selected: a conglomerated network, with one co-ordinating head and independent sub-systems. (See figure 4.5.4a.)

As designed, this conglomerated network has six basic elements.

a) Infrastructure: All institutional bodies holding information resources, such as libraries, archives, government units, data banks, etc. These information sources play a double role: first, as users' information sources and second, as national information resources. For this latter role, the resources have to be identified in a certain

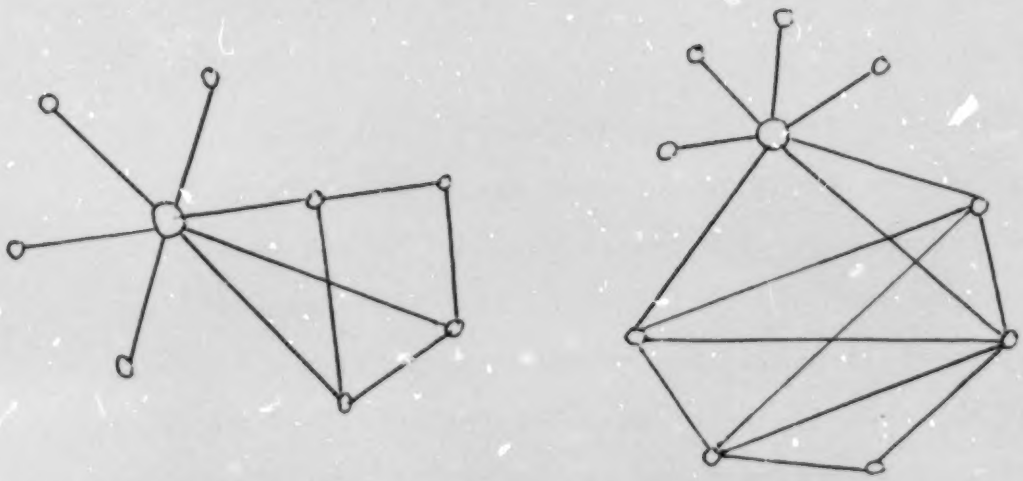


Figure 4.5.4a Conglomerated networks.

fashion that allows them to be used extensively. The internal frame of the infrastructure may be well represented by superimposing different kinds of networks. The infrastructure has a co-ordinator and several independent subsystems on the periphery with regional co-ordinating, depending on the functions being performed - cataloguing, retrieval, etc.

b) Specialized Information Systems: Active information services which analyze and evaluate information and handle non-documentary information. These specialized information centres depend a great deal upon the infrastructure.

c) Mechanisms of Communication: a portion of the CONACYT system, which is a co-ordinated network of multidisciplinary units. Its function is to stimulate consumption of information. It is oriented basically toward the productive sectors of the country. Recently CONACYT created Servicio de Informacion Tecnica (SIT). Service of Technical Information. This service co-ordinates and promotes unity of the information system for industry.

d) Horizontal Supports: Personnel, training, research, etc.

e) Co-ordination and planning: A co-ordination committee inter-grated by (ONACYT and other interested institutions,

with the following functions, among others: establish general policies for the operation and development of the system; execute the co-ordinating activities as required.

f) Users: The element which justifies the existence of the system is an element of the system. Every other element works to solve users' problems. CONACYT studies showed that the constraints of the present information systems denied the potential user the opportunity to get benefits from these systems. Lack of knowledge of the possibilities of the system as well as the unknown mechanisms of the system were barriers. Programmes to educate users are an integral part of the CONACYT network.

Through the conglomerated network organization, some specialized information networks are possible which support the development of the social sectors that have priority in Mexico's development plan. CONACYT is already studying the structures for some of these as shown by the superimposition of farm, industry and biomedicine information networks on the CONACYT system configuration.

ORGANIZATION OF INFORMATION SYSTEMS/SERVICES
DESIGN ELEMENTS OF NATIONAL SYSTEMS OF INFORMATION SERVICES

The analysis of reports and experience from developed Countries shows the need to establish and build up a system of information services, using a systems approach which would include a comprehensive design of the System itself, its links, internal and external relations, functions, ways and means of operation. This Systems analysis is based on both the present situation - its gaps and strengths - and the future tasks of the system. Organizational links between such services might be designed as part of a national system centrally co-ordinated for operation and development. The design of the system is a painstaking and time consuming task. For the elaboration of the design the assistance of international organizations and experts from developed countries may usefully be employed.

A system design would contain the following main elements:

a) Analysis of the information needs of the users, taking into consideration the present and estimated figures of potential users, their classification according to qualifications and specialization.

b) Analysis of the present situation of library holdings and information services.

c) The design of the main links of the system which are to form a network in the country.

d) Estimation of the number of personnel necessary for the system of services, classified according to the annual growth - rate, and qualifications, together with a plan for training, both at home and abroad.

e) A design for the provision of space, material and techniques, with emphasis on correlations between the technical equipment and the individual links of the system - especially important when the computing, communication and reprographic technologies are gradually introduced.

f) A planning and development policy statement which would stress information policy objectives and cover legal and economic problems.

(g) Planning of financial means for the realization of the system, in which allocations both from the state and from other sources eg. industry or institutions, are combined.

.) Creation of an activation mechanism, such as the establishment of a national focal point and a UNISIST national committee.

Standardization - Nationally done to suit the users.

References:

(1) PAULINE ATHERTON. Handbook for Information Systems and Services. UNESCO, Paris, 1977.

Sample of a questionnaire for finding out Information regarding Information and Documentation facilities

QUESTIONNAIRE: I & D FACILITIES

Interviewer: Interviewer's Organisation:

Person Interviewed & Position: Date:

A. Parent Organisation:

Ownership by: O Government O Private (Profit)
O Local Authority O Private (Non-profit)
Other Public O Other non-public

Type of Organisation: O Educational O Professional Ass.
O Research Inst. O Industry
O Govt. Public Office O Commerce
O Foundation O Religious
O Museum O International
O Other (explain):.....

B. Name of Facility:

Type of Facility: O Library O Archive
O Document Centre O Laboratory
O Inform. Analysis C.O
O Consulting Organ.
O Other (explain):.....

Year established:

Address:

Phone No: Telex No:

C. Services Provided: (+ = yes; - = no)

Services \ Admission and Fees	Employees of Parent Organisation	Students & Researchers	On Recomm. By Individual Consideration	General Public	Free of Charge	Membership Fees	Commercial Fees
Use of Reading Room							
Borrowing/Lending							
Searches, Literature (M) (x)							
" " (C) (x)							
" , On-going Res (M)							
" , " (C)							
" , Experts (M)							
" , " (C)							
Searches, Data (M)							
" , " (C)							
" , Institutions (M)							
" , " (C)							
Current Awareness							
SDI (M)							
SDI (C)							
Photocopying							
Microforming/-reading							
Publicat. of Bibliographics							
" " Inventories etc.							
" " Data Collect.							
Magnetic Tapes							
Online Use of Bases							
Information Analysis							
Consulting Services							
Others (expl.).....							
.....							
.....							

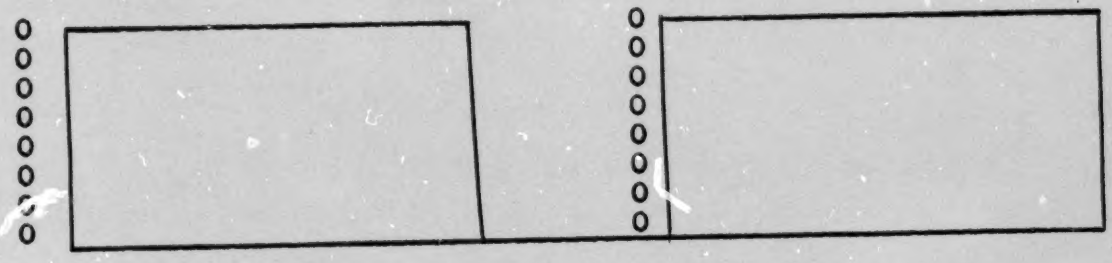
x M = Manual, C = Computerised

Days and hours when open:

If published services are offered, list them (title, intervals, number of items, indexes etc.):

Other services which require explanation:

D. Subjects covered centrally (1), Marginally (2):



E. Library Collection:

	Numbers	%	Yearly additions 1977	1978	1979
Books (Vols.)					
Periodicals (titles)					

Specialized Collections (only if considerable):

Reports (Grey Literature)					
Newspapers					
Newspaper cuttings					
Manuscripts					
Fotos					
Maps/Aerial Fotos					
Films/Slides					
Musical Recordings					
Others (expl.).....					
.....					
.....					

Languages:

Main language: Estimated %
Secondary language: " %
Other languages (if considerable): " %
Rules for Bibliographic Description:
Rules for classification:
Catalogues/Filing System:

F. Documentary Stores:
Bibliographic Stores:

	Numbers.	%	Yearly Additions 1977	1978	1979
Books (doc. units)					
Articles/contrib. (Doc. u.)					
Reports (Grey Lit. (Doc.u)					
On-going research (d. .)					
Others (expl.)					
.....					

Languages:
Main language: Estimated %
Secondary Language: "
Other Languages (if Considerable):.....
.....
Prices for Bibliographic Description
Indexing language/Thesaurus:
Catalogues/Filing Systems:

Computerisation: 0 yes, 0 no, 0 planned
Available on tape: 0 yes, 0 no, 0 planned
Available on line: 0 yes, 0 no, 0 planned

Other (mechanical) retrieval systems:

Document Delivery: 0 yes, 0 no

Other Stores:

	Numbers	%	Yearly Additions 1977	1978	1979
Experts (d.u)					
Institutions (d.u)					
Others (expl.).....					
.....					

Filing System:

Data Collections:
(describe kind and extent)

G. Premises (in m^2):

Total area:
User's area (reading-room and open stacks):
Closed stacks:
Catalogue area:
Work area for staff:
Technical Area (printing, copying, microforming):
Area for meetings/lectures etc.:

Is space available for expansion? O yes O no

H. Budget

(Data cover budget year:)
Does the facility have a pre-planned separate budget?: O Yes
O No

If "yes", State percentage of budget provided by:
Parent organisation: %
Service Fees from users: %
Grants from foundations or govt.: %
Other sources %

Describe "other sources"

Total expenses:
Acquisitions:
books :
periodicals :
Salaries :

1. Personnel

Total number of graduate professionals:

Numbers	Kind of Degrees

Total number of non-graduate professionals:

Numbers	Kind of courses

Total numbers of non-professionals:

Number of temporary employees (skiduds, abstracters etc)

J. Technical Equipment:

Machines for	Yes	No	Type
Card duplicating			
offset printing			
Photocopying			
Microforming			
Microreading			
Book-binding			
Others (expl.).....			
.....			
.....			

K. **Users:**

Total number (last year):

(if not counted, estimate)

Estimated Distribution:

From parent organisation:	%
From outside	%
	100 %
Students	%
Researchers	%
Government Officials	%
Private Sector	%
Others (expl.)	%
	%
	100 %

RECORDS MANAGEMENT (CREATION AND MAINTENANCE)

By Francis Inganji

"Records" is intended to include correspondence records, personnel records, general purchasing documentation, finance records, research records and operational forms.

"Records Management" includes all methods of storing and retrieving such data whether located in the headquaters, regional, district or field office of the department. It means dealing with and assuming responsibility for:-

a) The systems, procedures and equipment for the documentation and organisation of records;

b) The identification, preservation and security of records of continuing value.

c) The systematic elimination or transfer of obsolete or dormanent records.

d) The development of improved records reference services and retrieval techniques, and

e) All mail and messenger operations and services.

It should be noted that microform records and those designed and processed to be read by machine have not been included in this paper.

DUTIES AND RESPONSIBILITIES OF THE RECORDS MANAGER

The duties and responsibilities of the Records Manager are outlined as follows:-

i) Managerial and Supervisory

ii) Advisory

This represents all the recommended duties and responsibilities of a records manager and his subordinates in a large operating department. In a small department, where operations are more limited, which therefore, requires a less complex records programme, many of these duties and responsibilities may be handed directly by the records manager rather than through subordinates. In some departments it is the practice to assign some of these duties to employees of other divisions or branches, but it has been found that the records management function is performed more efficiently and economically where the duties and responsibilities are centrally controlled. Such a centralization of control can operate effectively even where the operations of a department have been physically decentralized for better service.

(i) Managerial and Supervisory

(a) Develops and coordinates records practices and procedures in the department, plans and directs technical improvements in such practices and procedures, and participates in the development and issuance of procedural/operating manuals for:

i) Mail operations and services

ii) Messenger operations and services

iii) Administration of coordinated classification systems

iv) Organisation and operation of records maintenance systems

v) Administration of records inventories

(vi) Organisation and administration of retention and disposal schedules.

(vii) Economical utilization of equipment, supplies and space.

(b) Supervises the management of all records registries in the department, either personally or through subordinates, including registries in regional, district and field offices.

(c) Acts as Chairman or Secretary of a departmental records committee, and represents the department as required, at Government meetings on Public Records.

(ii) Advisory

(a) Advises senior management on all the records management policies of the department or assists specialists in the relevant fields, including:-

(i) The theory and practice of records systems.

(ii) The economic value of an effective records management programme.

(iii) The application of new technology (e.g. microform) to records systems.

(iv) The application of automated techniques to records systems; and

(v) The application of relevant passages in existing and proposed legislation which involve the creation and retention of records by the government and the public.

(b) Participates in the development of new departmental systems and programs where these will affect records management.

(c) Consults with, interprets and implements the policies on records management issued by policy-issuing agencies.

(d) Collaborates with the departmental forms manager in the review of the use of completed forms as records.

(e) Makes recommendations on equipment and supplies necessary to conduct the operations of the records management program.

(f) Recommends the organisation and establishment of departmental records units including considerations of numbers, qualifications and classifications of staff.

In addition, a Records Manager should be responsible for training records, management personnel and for developing orientation courses and records appreciation workshops for departmental officers.

IMPORTANCE OF RECORDS MANAGEMENT

(1) Documentary papers are written records kept to obtain and retrieve information when required, and not for the sake of keeping the records. The number of variety of functions of a modern government have created a continuing requirement for all kinds of administrative, legal, fiscal and informational data. Literally, all government operations are conducted by means of a mass of these papers, which are eventually poured into containers known as "files". In their turn, the files contain the information required to account to Parliament and to the public for the government activities. They will cover such matters as revenue and

expenditures, the rights of the private citizen, the rights of employees, the results of scientific research, and the past experience which is often used as the starting point for future planning and decisions.

(2) It would be impossible for government to carry on without these paper records. The servicing staff in the records offices are responsible for the administration, control, custody and preservation of these instruments of management. However, the responsibility does not beyin and end with the custodians. Executives and administrators need the facts contained in the records and they may need them quickly. Accordingly, they must recognize that the management of the records should be under the control of one other administrator - the Records Manager - and that, if the Records Manager is competent and qualified, interference in his sphere will promote confusion.

(3) While it is important that records be handled with maximum speed and accuracy, and while no effort should be spared in aopting methods which will make filing and finding faster, there is also that question of costs. Up to the beginning of this century, record-making and record-keeping - and the costs thereof - were controlled by simple factors. Writing and copying by hand were laborious (and probably inaccurate) with the result that the number of records to retain on file was small. The later advent of the modern reproductive machines has made it possible to create records at will for the information of many without limitation on quantity relative to the time required to produce them. The volume of papers that pours out of these machines has

facilitated the conduct of business but had added considerably to the costs. These costs are not so much in the actual volume production of the records as in the space and equipment required to store them and in the salaries of the staff required to service them.

(4) It must be appreciated, therefore, that it is essential that efforts be made to keep down the costs of record-making and keeping. It may be well to stress the importance of records; it may be well to emphasize speed and accuracy in records handling; it may be well to say that the records office must provide this quick accurate service for the least possible cost. But the question remains how these objectives are to be achieved.

(5) Certainly, they will not be achieved by having the files cluttered with redundant material (non-record papers), by hoarding every piece of paper that happens to flow into the records offices, by applying haphazard classification systems, by using unsuitable and outmoded equipment. The problem of the classification of records is especially important and often complex. The view that filing the records is simple may be true for the physical act, but the determination of the correct file for the records is somewhat more than simple. The best way whereby proper objectives of a records office will be reached successfully is through a planned records management program.

(6) AIM OF A RECORDS MANAGEMENT PROGRAMME

There are several component parts to a good records management program. Some are:-

(a) the control of unnecessary record material, i.e. non-record papers;

(b) the classification of proper record material;

(c) the operational servicing of proper record material;

(d) the operational maintenance of proper record material;

(e) the regular transfer of dormant record material to low-cost storage; and

(f) the wise selection of record material either for disposal of preservation.

7. COMBINED PAPERWORK-RECORDS MANAGEMENT CONCEPT

In the minds of many, there is a question as to the boundaries between paperwork management and records management. Some feel that they are the same; others contend that one is subordinate to the other. Whatever view is entertained; someone has put the proposition in a way which seems to take in both contentions:

"A management information system is a communication process in which data are recorded and processed for command and management purposes. Problems are isolated for higher level decision-making and information is fed back to appropriate managers. This implies the gathering, transmiting, storing, collating and disseminating of information in a form designed to be of maximum assistance to management".

RECORDS MANAGEMENT CREATION AND MAINTENANCE

This is concerned with the substantial care of records. All records are dynamic structures of information, changing often in content

and occasionally in structure, sequence, or storage medium. In many retrieval systems, more time and money are expended on maintaining records/files than searching them. The speed and efficiency with which these operations are carried out often determines the cost of feasibility of the entire system. We are often constrained to organise file systems for optimum maintenance efficiency rather than for optimum search efficiency or speed. A system designer should not lose sight of the fact that well maintained records/files are as much user requirement as the ability to do high speed searching.

MAINTENANCE PRINCIPLES

The function of record/file maintenance consists just not one, but a collection of file processes whose results are:-

(i) Incorporation of new records into a file

(ii) Deletion of obsolete records

(iii) Modification of records

(iv) Change in record positioning, sorting and merging operations are performed as part of maintenance.

THE PHYSICAL MAINTENANCE OF FILES CONTAING RECORDS

This concerns the substantial care of the file jackets and their contents:

(a) The Chronological Sequence: of the papers on a file should be strictly maintained and observed. This is an elementary principle for correspondence since the purpose of the file jacket is to house the papers in an orderly, neat and logical way. In chronological order sequence, the latest paper by its date is always added to the top of the filed papers on the file.

(b) The Removal of Papers: Once placed on file should not be done carelessly. If there is a pertinent reason for this action, this should be authorized by a classifier and in any event should not be done outside the records office. If records are removed by user offices, this practice leads to confusion and time is always lost in the location of the records at some later date. The removal of papers by the records office can be controlled and accounted for by the officers concerned.

(c) The File Title Captions: Should be typed properly. The Records Manager should insist that file titles are not to be changed by user offices without proper consultation, and that this will be done by records office only.

(d) Policy Files: are meant for POLICY papers only. Where administrative or operational action follows as an outcome, these papers will be kept segregated to appropriate action files created for this purpose. Conversely, where a file contains or inadvertently originates precedents of POLICY and it is a routine action file the papers should be removed to the policy file or a new POLICY FILE should be created. If necessary, the original routine file may be retained complete for continuity by substituting copies of the papers which are removed.

(e) The expansion: of the subordinate secondary files of a subject classification must be controlled by constant scrutiny of the files. Where they tend to accumulate papers at a rate which requires new volumes frequently, then action should be taken by the classifiers to examine such files to create:-

(i) Sub-subject secondary files of the primary subject,

(ii) Sub-subject tertiary files of the secondary files; and

(iii) Subordinate code files by departmental organisation, by other organisations, by locations by geographical divisions, by items for commodities, etc.

(f) Volumes of specific files are indicated by their numbers on the file jackets at a per-determined and pre-printed location. Volume numbers for files as for the volume numbers of books should only be instituted when the main original file has reached the point where a new second volume is necessary. In other words the main original file has reached the point where a new second volume is necessary. In other words the main original file jacket should not be identified as Volume 1, until the Second Volume - Volume 2 is created, then the original file jacket is identified as Volume 1. The most convenient place for the separation of the papers by volume must be chosen logically, i.e. by fiscal years for financial documentation, by calendar years where this is more suitable, and by natural portions of these years in quarterly or semi-annual It is

advisable to use Arabic numbers, NEVER Roman Characters. The front cover of the file jacket of a volume must be stamped "CLOSED" and a "Closed Volume" sheet placed on top of the file contents as the first folio therein.

(g) Pre-Punching: of loose papers should be done in bulk, before placing them on file, to ensure neatness. Where volume of papers justifies it, an electric paper drill should be obtained for this purpose. The forcing of loose papers onto the file spike must not be permitted.

(h) The Put Away: of loose papers onto the files should not be completed before the file reference numbers on the papers have been compared with the numbers on the file jackets. In addition, the file subjects should have been checked by the classifiers to ensure that the papers have been indexed to the proper subject files. Further, a fully trained file clerk with some experience in the area of subject classification should examine the file to prevent any gradual deviation from the main topic and draw such instances to the attention of the classifiers for possible adjustment.

(i) Copies of papers may have to be made when the correspondence deals with more than one subject or when more than one file reference number is noted or referred to. The first file number quoted will be the control file for action. When copies have to be prepared for new incoming matter, the original will show the file numbers for the copies will indicate that the original is on the first file quoted. This notation may be done by the use of a rubber stamp with appropriate wording and check-off-marks.

(j) Pass notification forms must be processed daily and not allowed to accumulate.

(k) B.F. Files must be actioned on the day prior to their due date so that they will be ready for delivery on the first delivery for that day. This also applies to the delivery of any B.F. Notification forms completed for files which do not happen to be available in the records office.

(l) Accessibility to the file containers must be restricted to the operating staff of the records office. It is their duty to maintain and service the records. Unauthorized personnel must not be permitted to interfere with the records operation or to indulge in "self-service".

(m) The Physical Security of the records and the records office must be maintained at all times and this is especially necessary during the silent hours.

(n) Closed Files and Closed Volumes of Files
Must not be retained in the active file room area. They should be transferred systematically and regularly to an interim dormant storage area and/or to the Archives Records Centre in suitable accumulations by periodic accessions.

RECORDS MANAGEMENT CONTROL (RETRIEVAL)

1. The functions of records offices are similar even though their subject classifications, their working details, their physical locations and other factors may differ in minor respects. The

complete work-flow for new records coming into a department will follow a pattern which will include all, or only some of the steps outlined.

(a) Receipt through the mail room

(b) Sort of particular material in the mail-room for records office processing;

(c) The classification, indexing and coding as required in the records office;

(d) The attachment to file process in the file room section;

(e) The mail record process ONLY WHERE JUSTIFIED;

(f) The delivery process through the messenger service, and

(g) The return to the records office for the final put away process in the file room Section.

2. The mail-room receives all incoming material - new material, previously processed material, memoranda, requisitions, passes, put away files, put away papers. This material is sorted, segregated and directed into the correct distribution flow. Now incoming material will flow to the classification section for processing prior to delivery to action offices. In the classification section an operational aid in the form of a prefabricated rubber stamp should be devised along the lines shown in the illustration below:-

New Record Classification Stamp

Entries made by the classifiers

Entry by file Room Clerk

REFERED TO R.M.O.

FILE NO.3740-OR

CHARGED TO R.M.O. 4/9/80

3. The Classification Process:

The new incoming records are processed by the classifier who:-

a) Stamps the material at the best convenient open space preferably near the top right corner,

b) Reads - scans to determine the subject classification, the specific index and/or coded file reference number;

c) Enters this file reference number within the rubber stamp impression;

d) Enters the appropriate action office at the line "Referred to",

e) Indicates that a mail record is required by writing the symbol "R"

f) Segregates the material into two groups for "NO RECORD" and "RECORD" mail; and then

g) The material is picked up by the file room clerks for further processing.

4. The File Room Process:

The file clerk picks up the material from the desks of the classifiers and applies one of three possible alternative file operations:-

ALTERNATIVE NO.1 - When the File is "IN"

a) The appropriate file as shown in the stamped impression is removed from the file containers;

b) A charge-out form is completed and inserted into the file container in lieu of the file removed;

c) The file jacket is completed by writing the action office as shown in the stamped impression at the line "Referred to";

d) The other entries on the file jacket at the same line are entered by the use of another rubber stamp operational aid reading "with papers and the date";

e) Action (c) is always done at the file container station while action (d) is only done at this same station for "No Record" material (for "Record"material, this stamp is made by the Mail Recording Clerk at the mail recording station");

f) The material is spiked onto file inside the file jacket (if there is more than one item, spike the first and pin the others to it);

g) The "No Record" material is distributed into the delivery boxes by the file room clerk; and

h) The material for recording is taken to the mail record desk, processed, and then distributed into the delivery boxes by the mail recording clerk.

ALTERNATIVE NO.2 - When the File is "OUT"

a) If the file is charged out, the information is written on the allotted line by the file room clerk; and

b) If the charge-out information shows that the file is with the action office designated by the classifier, the material is processed thereafter as loose material either for direct "No Record" delivery or for delivery after mail recording at the mail record desk.

ALTERNATIVE NO.3 - When the File is "OUT" for "RECORD"Material

(a) When the file is charged out but is not with the action office designated by the Classifier, and the material has been indicated for "Record" action, then its importance, as assessed by the Classifier, will justify the creation of a temporary docket, and

b) The temporary docket will be created by the mail recording clerk, charged out as required and the docket distributed to the delivery boxes.

5. The Mail Record Process:

The mail record clerk receives the material designated for "Record" by the classifier and makes the appropriate entries on a card system. Temporary dockets will be created as defined at Alternative No.3.

6. The Distribution Process:

All material which has been processed through the file room process and the mail recording process is sorted into properly labelled delivered racks set up in the file room. This material will be picked up at the established delivery times by the messenger service and delivered to the action offices.

JOB OPERATING PROCEDURES ATTACHING NEW RECORDS TO FILE

Step No. 1 - Obtain new records from the classifier,

Step No.2 - Arrange the records in numerical order by the file number references,

Step No.3 - Obtain a supply of charge-out forms

Step No.4 - Proceed to the file containers,

Step No.5 - Remove files according to the numbered new records from the file containers,

Step No.6 - Complete the charge-out forms as appropriate,

Step No.7 - Place the completed charge-out forms into the file container in lieu of the files,

Step No.8 - If a file is charged out, write office and charge date on the appropriate lines of the stamped impression on the new records,

Step No.9 - Enter the action office on the next available line of the "Referred to" column on the face of the file jacket,

Step No.10 - Continue as above for all the new records,

Step No.11 - Stamp all file jackets with the impression "With papers and date"

Step No.12 - Place all new records - files and loose papers indicate for "Record" by the Classifier, at the mail recording desk,

Step No.13 - Distribute all "No Record" material into the delivery system boxes.

THE CLASSIFICATION PROBLEM - CONTROL OF RECORD MATERIAL

The deversity of functions in a department, the organisational complexity of its structure, the number of personnel under its jurisdiction and the technical, scientific or operational peculiarities of its activities all combine to make the records management programme a challenge which must be met and solved.

The main key to a successful records management operation is the subject classification system. In the small department, the problem will not be so great as in a large department where the variety of subjects dealt with is likely to be greater. The volume of the records handled will not change their use although it may affect the speed with which action is handled and completed. A good subject classification system will increase the output of every office and raise the effective production of the officials who rely on the records for their necessary information prior to action.

2. Records, as with property and other tangibles, should be used and then disposed off according to their value. Some become obsolute and lose their utility, others have permanent value and must be retained. Systematic disposal of the temporary records economizes on floor space and equipment, and contributes to the prime purpose for mainting records - find when and where required.

3. In large departments with a wide range and volume of papers to be classified, indexed and/or coded, it will be advisable to divide the classification operations into separate segments. These segments will be assigned to several classifiers by pre-determined groups of the classification system. A rotation method should also be established.

4. There are several prerequisites for success in proper subject classification activity. They include:-

a) A thorough knowledge of departmental programmes;

b) A thorough knowledge of departmental structure designed to carry out its programmes;

c) A thorough knowledge of the subject classification system and its operational details;

d) An insight into how the records will be used and asked for;

e) An analytical mind;

f) A thorough knowledge of procedural techniques; and

g) Accuracy and consistency on the part of the classifier.

THE SUBJECT SELECTION TECHNIQUE

The Act of Classifying

a) Read the paper to determine the subject of PRIMARY IMPORTANCE in the text - with skill, this act of reading will become scanning.

b) Identify and select the broad subject classification group into which the subject of primary importance falls;

c) Consult and select the PRIMARY SUBJECT HEADING AND NUMBER within the broad classification group which fits the subject of primary importance.

The Act of Indexing

d) Determine whether the intent of the text is POLICY or money GENERAL ROUTINE;

e) If the intent is POLICY, use the policy file number under the selected Primary Subject Heading and Number

f) If the intent is not policy but GENERAL ROUTINE, and definitely not particular, use the general file number under the Primary Subject Heading and Number;

g) If the content is neither POLICY nor GENERAL ROUTINE, consider and decide what sub-subject of the main Primary Subject Heading has the most appropriate relation;

h) Consult the relative subject indices organized in their relation to the Subject Classification Scheme which will guide to the particular relative sub-subject file title and number; or

i) If no suitable or appropriate file exists as determined from the indices, and therefore the paper is of a NEW particular nature, number the paper for a NEW FILE with the next available sequential number under the Selected Primary Subject Heading and number as found by consulting the NUMERIC INDEX CONTROL, assign the appropriate file title, and have the new file created.

The Act of Coding

j) OR, if the content of the paper relates to an OBJECTIVE CODE, consideration such as a departmental unit, another organisation, a particular location, a geographical division, a specific commodity or other object and it is decided that such a particular file is justified, classify under the originally selected primary subject heading and number to the specific OBJECTIVE CODE SYMBOL for individual identification;

k) RUT, when this code file does not exist and the paper concerns an OBJECTIVE CODE, select the correct objective code symbol, and have the new file created.

TRANSFER, STORAGE AND DISPOSAL OF DORMANT FILES

1. The continous transfer of files from the current to dormant files storage area is a good house-keeping procedure in itself, apart from the other reasons for this activity. It is necessary for the practical considerations of economy of space, equipment and labour. It promotes ease of filing and ease of finding both the active files and the dormant files.

2. An acceptable time period lapse from active to dormant status for files is when no additional records have been added to the file for about two years or over. Then such files are transferable and should be moved to an intermediate dormant storage area or to a public Archives Records Centre. Since an intermediate dormant storage area is an interim step, files so stored may be returned to active status as they may be required to be reactivated. This applies also for files at a records Centre. Closed volumes of active files are automatically transferable.

3. When no transfer of dormant records is made, the file containers will tend to become too crowded with material which gives no correct service value. An active storage is costly in comparison, the files in their crowded state become ragged and torn, and the required active files are not produced with proper speed.

4. One of the major duties of records office is to apply consistently the authorised records disposal schedules. This can

be done more effectively when the files which may be disposed of are segregated from the active files in the file room. Where a departmental storage sub-file room is organized, it will have a three-fold interim outlook:-

a) One to and from the main active file room

b) Another to and from the branches, divisions and other units of the department; and

c) The third to the Public Archives Records Centre.

A fourth and final outlook will be the conscientious application of the records schedules performed as an established function to dispose of all redundant records.

CONSOLIDATED OPERATING POINTERS

1. Filing Operations

a) Do each day's filing of files and papers,

b) As a record is being filed, check it against the contents of the file, and the file number to prevent misfiling,

c) Adhere to a strict chronological sequence - do not staple together and file together incoming and outgoing correspondence,

d) Do not separate attachments from together under the date of the covering paper,

e) Do each day's B.F.'s on the day prior to the due date,

f) Do not overload the file jackets

g) Create new volumes for files immediately as required,

h) The first step in training a new employee should be to teach to sort or to withdraw from the records,

i) NEVER allow an untrained file clerk to insert INTO the records unless supervised closely during a training period.

2. File Containers:

a) Do not allow too much space for expansion in cabinets or shelves;

b) Conversely, do not allow cabinets or shelves to become over-crowded;

c) Provide sufficient file guides,

d) Label the file cabinets and drawers, and the file shelves and bays,

e) Label each row of cabinets and shelving,

f) Keep the transfer of dormant files up-to-date,

g) Maintain a follow-up examination of transferred files for further disposal action continously under approved records scheduling authorities.

ANNEX A

TERMINOLOGY

1. GENERAL REMARKS

(1) The Records Management Institute - formerly known as the Records Management Association - attempted twelve years ago to draw up a set of terms for use in records management operations in the Government of Canada. Recently, another effort was made to establish a uniform terminology. As a result of these two projects, the definitions of the terms listed below have been compiled and are presented as a consensus of Records Managers who have many years of experience in the records management field.

(2) The advantages of standardizing terms are obvious. The pitfalls of semantics will be avoided by the adoption of standard terms. Therefore, with the knowledge that much thought, time and effort has been expended on the list which follows, Records Managers should train their staffs to use these terms as shown and to point out to them that, when they use a certain word or phrase, their meaning should conform to the definitions given hereunder.

2. DEFINITIONS

ACCESSION:	A group of records removed from custodial department and transferred into the controlled guardianship of a Public Archives Records Centre for economic storage and service.
ACTIVE RECORD:	A record which is transferred to and repuired constantly for current use by a department in the conduct of its business and which must be retained and maintained in office space and equipment.
A.D.P.:	Automatic data processing - see under DATA PROCESSING.
ADVISORY COUNCIL ON PUBLIC RECORDS (ACPR):	The council established under P.C. 1966-1749 dated 9 September, 1966. (CANADA).
ALPHABETICAL SUBJECT:	A file classification system for arranging subjects by the use of words.
ARRANGEMENT:	The process of putting or sorting records into a proper sequence either in an alphabetical or numerical order.
B.F.:	BRING FORWARD - A system used to ensure that files or records not currently required by an office(r) are returned to the records office and then charged back to the same office(r) on a prescribed future date.

BLOCK SYSTEM: A file classification system whereby the subjects are arranged into separate classes, groups or "blocks" of primary subjects and primary numbers from which sub-subjects are derived by secondary numbers in sequence; the primary numbers may be in a one, two, three or four digit series.

BOOK: As included under "Public Records" comprises purchasing ledger, accounting ledger, bound copy of report of investigations, surveyor's note book, etc.

BRING FORWARD: See under "B.F."

BURNER: See under "INCIDERATOR".

CALENDAR YEAR: The period January 1 to December 31.

CARD: A thin ruled pasteboard of varying sizes (normally 5 inches x 3 inches, 6 inches x 4 inches or 8 inches x 5 inches) used for index entries: as included under "Public Records", comprises "punched card(s)".

CASE FILE A file containing material relating to a special action, event, person, product, etc., and usually filed by name and/or number rather than by subject.

CENTRAL REGISTRY: See "RECORDS OFFICE"

CHARGE-OUT: A control procedure maintained to establish the current location of a file or document when not in the records office.

CLASSIFICATION CONTROL: A central operation which controls the creation of files through a uniform interpretation and application of a predetermined classification system.

CLASSIFICATION SYSTEM: See "FILE CLASSIFICATION SYSTEM".

CLASSIFIED MATTER: A record which has been assigned a security classification and which requires security protection. The degree of protection varies with the assigned security classification, i.e. Top Secret, Confidential, Restricted.

CLASSIFIER: A person who analyses and determines the subject category under which it will be filed in accordance with a predetermined classification system, and assigns the appropriate subject file number to the document for subsequent retrieval.

CLASSIFYING: The act of analysing and determining the subject content of a document, selecting the subject category under which it will be filed and assigning the appropriate subject file number to the document for subsequent retrieval.

CLOSED FILE: A file containing material relating to an action or event which has been terminated.

CLOSED VOLUME: A volume of an active file, which is still required for current use, cut off at a definite time period or at a definite event.

CODE: A number or symbol assigned to group together related correspondence concerning a particular location, person, organisation, product, etc., in lieu of the proper name or title for the purpose of abbreviation and identification.

CONFIDENTIAL: A security classification concerning documents, information and material, the unauthorized disclosure of which would be prejudicial to the interests or prestige of the nation, would cause damage to an individual, or would be of advantage to a foreign power.

CORPORATE RETENTION: Retention periods for records laid down by legislation or regulations concerning the various records maintained by business firms.

CROSS INDEX: An entry recorded in an index directing attention to another related subject or name, etc., for the purpose of information retrieval.

CROSS REFERENCE: A relative reference made from one record to another from one subject heading to another or from one file to another.

CRUTCH FILE: A file which contains extra copies of correspondence, invoices, etc., and which is maintained in an office for the purpose of convenience.

CUT-OFF: The stage at which files should be declared closed, e.g., a closed file/closed volume of a file. This is usually termination of an event, project or time period of a calendar or fiscal year.

CUTTER SYSTEM: A system developed primarily for library use which may be effectively applied as alpha-numeric codes for locations, geographic divisions, names of foreign countries, names of government departments, etc.

DATE PROCESSING (ADP:EDP:IDP:) The processing of information by mechanical or electronic operation.

DEAD RECORD: A record on which all activity has ceased and which should be destroyed or transferred to the Public Archives, if it has any long-term informational value.

DECIMAL CLASSIFICATION SYSTEM:	A subject classification system developed in union of tens and hundreds for the arrangement of subject headings. See also "DEWEY DECIMAL SYSTEM".
DESTRUCTION:	The physical disposal of records by mean of burning, pulping, shredding, or by sale as salvage.
DEWEY DECIMAL SYSTEM:	A classification system developed primarily for library use.
DISPOSAL OF RECORDS:	See "RECORDS SCHEDULE".
DISPOSITION:	See "RECORDS SCHEDULE".
DOCUMENT:	See "PUBLIC RECORDS".
DORMANT RECORD:	A record of a department which is not required constantly for current use in the department and need not be maintained in office space and equipment. The term does not include a closed volume of an active file.
DUPLEX NUMERIC:	A file classification system with the arrangement or grouping of many specific file subjects (Tertiaries) under a number of sub-headings (Secondaries) derived from a very broad descriptive main heading(PRIMARIES)
E.D.P.:	Electronic Data Processing - see "DATA PROCESSING".

ESSENTIAL RECORDS: A record which provides information in one of three categories:

a) for the conduct of survival operations during the shock phase of an emergency;

b) in the recovery phase of an emergency, to re-establish the organizational pattern and the basic functions and responsibilities of government; and

c) in the recovery phase of an emergency, re-establish the basic rights of individuals, corporate bodies and governments.

FALSE DOCKET: See "TEMPORARY DOCKET".

FILE: A collection of papers and documents on a specific subject or subject aspect within a file jacket, shannon file, etc. which have been arranged therein in some logical sequence, usually by date order.

FILE CLASSIFICATION SYSTEM: A logical and systematic arrangement of records into subject groups or categories based on some definite scheme of natural relationships using numbers or letters for identification.

FILE CREATION: The addition of individual file(s) within a file classification system.

FILE FOLDER: A plain kraft or manilla paper folder usually tabbed to house files and papers. (IT is NOT a file jacket).

FILE JACKET: The printed form, folded to provide a front and a back, to which papers are fastened. The file number and title are typed on these jackets and provision is made for the recording of the movements of the files.

FILE MAINTENANCE: See "MAINTENANCE OF RECORDS".

FILE MANNUAL: A publication to aid and control the filing or records setting forth a particular file classification system with details on its application and operation.

FILE NUMBER: The number or symbols assigned to identify a specific file.

FILE PLAN: See "FILE CLASSIFICATION SYSTEM".

FILE STATION: A unit of a records office located near a user organisational unit (branch, division, etc) for the purpose of performing only routine records operations for that unit or specific area (floor, etc.). These records operations would include mail, messenger and charge-out duties normally.

FILING Placing papers on file, returning files to their appropriate folders in the file containers (cabinets, shelving) and the arranging of cards in appropriate containers.

FILING ARRANGEMENTS: The arrangement of files by a systematic method based on the two basic symbols or a combination of these two bases: one is the letters of the alphabet, and the other is numbers.

FILM: As included under "PUBLIC RECORDS" comprises microfilm, documentary film, etc.

FISCAL YEAR: The twelve month period commencing at April 1 and ending at March 31 of the following year.

GEOGRAPHICAL FILING SYSTEM: The classification of records by geographical location of the individual, organisation, or project concerned, usually arranged in alphabetical order: within the geographical location, the name or number by which the specific item is identified may be in alphabetical or numerical order.

HOUSEKEEPING RECORD: A record pertaining to housekeeping activities such as everyday personnel, financial, purchasing and property-control actions, i.e. internal economy matters.

I.D.P.: Integrated Date Processing see "DATA PROCESSING".

INACTIVE: See "DORMANT RECORD".

INCINERATOR: A device used for the destruction by fire of records, which are normally security classified.

INDEX(ing): A finding aid in a card, list or table form, normally arranged alphabetically for the purpose of reference to a name, subject, object, or place dealt with in a file: and to make an entry into an index or to complete a complete index.

INDEXER: A person who maintains and operates a uniform method of indexing or arranges an index so as to facilitate the retrieval of information.

INVENTORY OF RECORDS: A descriptive list, usually by series, of the records, or part of the records, of a department or agency: and an account or report itemizing each type of record and non-record material indicating the description, quantity and other pertinent data.

KARDEX: The trade name for a visible card index system.

KARDVEYER: The trade name for a mechanized (electrical or electronic) index card storage and retrieval unit.

LABELLING: In filing or records storage, the process of providing suitable slips of tags to identify the contents of containers, shelves, rows or areas.

LETTER SIZE: Capable of accommodating chiefly letter size papers, i.e., 8½ inches x 11 inches.

LEGAL SIZE — Capable of acccmodating legal size paper, i.e. 8½ inches x 14 inches.

LIBRARY OF CONGRESS SYSTEM: A classification system developed primarily for library use.

LINEDEX: The trade name for a visible card system.

MAIN FILE: The official file created for a specific subject, as opposed to a "Temporary Docket".

MAINTENANCE OF RECORDS: The manner of grouping, filing, storing and safeguarding records.

MAP: As included under "PUBLIC RECORDS" comprises representations on paper of a land, water building, or utility system which have been compiled by a department or received by it.

MICROFILM(ing): To reduce in size by photographic process various records for the purpose of:-

a) Preserving an image of important original copies in the event of their accidental loss;

b) Reducing the volume of records to save space and equipment; or

c) Preserving essential records in the event of a disaster; and

d) Speeding up data processing operations and informational retrieval.

MICROFILM-READER — An item of equipment used to enlarge microfilm to readable size and permit viewing.

MICROFILM-READER-PRINTER: — An item of equipment used to enlarge microfilm to readable size, permit viewing and print copies of the enlarged film.

MICROPHOTO-GRAPHY: — See "MICROFILM(ing)"

MIDDLE DIGIT: — A method of numerical filing being a variant of the terminal digit filing system.

NAME FILE: — A file containing material relating to a specific person or organisation where the name in full is the "file number" or an integral part thereof. Such files are filed alphabetically.

NON-RECORD MATERIAL: — As included under "PUBLIC RECORDS" comprises library and museum material made or acquired solely for reference or exhibition purposes, extra copies of documents preserved only for convenience of reference, stocks of publications and processed documents, reading or chronological copies, etc. or other documents that do not serve as a basis for official action.

OFFICIAL FILE: — A file containing records described under "PUBLIC RECORDS".

OPERATING DIVISION:	A division of a department or agency charged with carrying out a part of the basic functions of of that department or agency.
OPERATING RECORD:	A record created by a department or agency while carrying out its basic functions.
ORDER IN COUNCIL:	An authorization or directive issued by the Privy Council office. It is numbered and bears the prefix "P.C.".
P.A.:	The abbreviation of "PUT AWAY" to return files, papers or cards to their normal storage place within cabinets, shelving, folders, etc.
PAPER:	As defined under "PUBLIC RECORDS" comprises an official copy of an address, article, cheque, completed form, invoice, manuscript, receipt, speech, etc.
PAPER WORK MANGEMENT:	That aspect of administration which includes the management of correspondence, directives, forms, reports and records.
PASS:	The transfer of a file or document from one office to another.
P.C.:	See "ORDER IN COUNCIL"
PERSONNEL RECORD(S):	The official departmental personnel files and all documents and records of earnings,

service and leave related to the career, or person, of any employee of the Crown, that are made or received by the department in which that employee is employed. The official personnel file does NOT include security clearances and related comments which are required to be filed separately.

PHOTOGRAPH: As included under "PUBLIC RECORDS" comprises a picture forwarded with a report to indicate clearly the scene of an accident, the condition of a building, etc. and includes aerial type photographs. Libraries of photographs compiled by departments for publicity, educational or informational purposes are not public records.

PLAN: See "MAP".

POLICY FILE: An official file containing records which reflect administrative usage, administrative regulation or administrative precedent OR which reflect governmental or departmental high-level management decisions or usage.

PRIMARY SUBJECT: The main topical heading in a file classification system.

PUBLIC RECORDS: Correspondence, memoranda or other papers, books, maps, plans, photographs, film, microfilms, sound recordings, tapes, punch

cards, or other documentary material regardless of physical form or characterististics that:

a) are made or received by any department in pursuance of federal law or in connection with transaction of public business;

b) are preserved or appropriate for preservation by that department; and

c) contain information on the organisation, functions, procedures, policies, or activities of the department or other information or past, present or potential value to the Government of Canada.

BUT DOES NOT INCLUDE

Library or museum made or acquired and preserved solely for reference or exhibition purposes, extra copies of records preserved only for convenience of reference, working papers, or stocks of publications or printed documents.

PUBLIC RECORDS COMMITTEE: The Committee established in 1945 to "keep under constant review the state of the public records, etc."; it was abolished by P.C. 1966-1749 or 9 September, 1966, and superseded by the Advisory Council on Public Records.

PULPER: An apparatus used in reducing certain security classified records to the form of paper pulp under water pressure.

PUT AWAY: See "P.A."

QUARTER: The period(s) January 1 to March 31 April 1 to June 30; July 1 to September 30; and October 1 to December 31.

RECORD(S): See "PUBLIC RECORDS".

RECORDS CENTRE: An office and building of the Public Archives of Canada established to store and service economically a large volume of public records. This office also provides advice on records management.

RECORDS CO-ORDINATOR: An obsolete term - USE "RECORDS MANAGER".

RECORDS DISPOSAL: The planning for and/or the physical operations involved in:

a) the transfer of records from active storage space to dormant or to a Records Centre;

b) the transfer of records to the public Archives of Canada; or

c) the authorized destruction of unnecessary records of no value.

RECORDS MANAGEMENT: The function of the administrative control and the technical operations and processes that govern all mail and messenger operations and services, and organisation of a classification system which covers the creation, maintenance and disposal of files and which includes the planning, organizing, controlling and

co-ordinating of staff, space and equipment in these respects of permit:

a) the logical grouping and segregation by classification for retrieval of information and the systematic disposal of records; and

b) the receipt, storage, care, custody, reference and research services for the records.

RECORDS MANAGER: The officer appointed in a department or agency to administer its records management program as specified in Order in Council 1966-1749, dated September, 1966, and Treasury Board Information Bulletin 1968-2, dated 8th April, 1968.

RECORDS OFFICE: The organizational element in a department or agency which is assigned the responsibility of planning, directing and operating the records management program.

RECORDS RETIREMENT: See "RECORDS SCHEDULE" and "RECORDS DISPOSAL".

RECORDS SCHEDULE: A list of public records approved by the Dominion Archivist indicating:

a) the length of time each type of record may or should be retained in the active records areas of departments and agencies before transfer to dormant storage; and

b) the length of time each type of record must be RETAINED BEFORE FINAL DISPOSITION.

REFERENCE FREQUENCY RATE: Re dormant status - a record which is not referred to at a rate higher than one inquiry per cubic foot of records per month.

REGISTRY: An obsolete term - USE "RECORDS OFFICE"

RESTRICTED: A security classification concerning documents information and material which should not be published or communicated to anyone except for official purposes, and when they are not classified in any other category.

RETENTION: The period of time which must elapse before disposal may be made of a body of records.

SCHEDULE: See "RECORDS SCHEDULE"

SECONDARY SUBJECT: The sub-heading grouped under the main subject, i.e. the PRIMARY subject's subordinate subjects headings.

SECRET: A security classification concerning documents, information and material the unauthorised disclosure of which would endanger national security, cause serious injury to the interests or prestige of the nation, or would be of substantial advantage to a foreign power.

SECURITY CLASSIFICATION: A security category assigned to information to assess its required security protection value as "Confidential", "Restricted", "Secret", or "Top Secret".

SECURITY SHELL: A steel enclosure with combination lock into which a filing cabinet is placed for the security protection of security classified records.

SHREDDER: A machine used for the destruction of certain security classified records by reducing the papers to fine strips or shreds.

SOUND RCORDING: As defined under "PUBLIC RECORDS" comprises a record which has been created through a sound recording device (e.g. of a speech).

STATUTE OF LIMITATION: A legally specified period of time beyond which action cannot be brought or the law is not to continue.

SOUNDEX: A commercial file classification system developed for large alphabetical name files permiting the names to be arranged by alpha-numeric codes.

SUBJECT FILE: The collection of papers on a specific subject of its specific sub-subject aspects placed together within a single file jacket.

SUBJECT-NUMERIC: A file classification system using a combination of word abbreviations and numbers.

SUB-RECORDS: A subordinate office which is controlled by and responsible to the main departmental Records office but which is physically located near and provides a complete records service to one or

	several departmental organisations.
SUB-REGISTRY:	An obsolete term - USE "SUB-RECORDS OFFICE".
TAPE:	As included under "PUBLIC RECORDS" comprises a record which has been stored on magnetic or paper tapes.
T.B. MINUTE:	The abbreviated form of "TREASURY BOARD MINUTE"
REMPORARY DOCKET:	A temporary file which is created when the main file is not available or for a special purpose.
TERMINAL DIGIT:	A method of numeric filing whereby the last or three numbers are read and considered as the first numeric filing unit and in which the complete number is read from right to left.
TERTIARY SUBJECT:	The subject heading which is subordinate to the secondary heading of the primary subject heading.
TITLE, FILE:	The caption or subject assigned to a file
TOP SECRET:	A security classification concerning documents information and material when their security aspect is paramount and when their unauthorized disclosure would cause exceptionally grave damage to the nation.
TREASURY BOARD MINUTE:	An authorization or directive issued, by the Treasury Board, which is numbered consecutively and which bears the prefix T.B.

UNITERM SYSTEM: An information retrieval system whereby the subject content of a document is analysed and indexed into basic word units through which the document can be retrieved.

VITAL RECORD: See "ESSENTIAL RECORD"

VOLUME: See "CLOSED VOLUME"

WORKING PAPER: A paper consisting of rough notes, calculations, preliminary drafts, punch cards, research notes, etc., used in the preparation of other records, such as correspondence, reports and statistical tabulations. Working papers become of little value once the finished product has been produced, and should be destroyed as soon as the finished product is available in readable form.

REFERENCES

1) Records Organization and Operation. Records management series, Public Archives of Canada, Printing and Publishing Supply and Services, Canada, October 1974.

2) **Records Management and Retirement. Report on Seminar. Arusha - Tanzania, 1st to 20th Nov., 1976. Nairobi 1977 (CRIT-SERIES 3/76)**

D O C U M E N T A T I O N

ISO - Standards and Recommendations
January 1980

1. Library Science and Documentation

ISO		Title
ISO	4-1972	Documentation - International code for the abbreviation of titles of periodicals
ISO	8-1977	Documentation - Presentation of periodicals
ISO/R	9 1968	International system for the transliteration of Slavic Cyrillic characters
ISO/R	18-1956	Short contents list of periodicals or other documents
ISO/R	30-1956	Bibliographical strip
ISO	214-1976	Documentation - Abstracts for publications and documentation
ISO/R	215-1961	Presentation of contributions to periodicals
ISO/R	233-1961	International system for the transliteration of Arabic characters
ISO/R	259-1962	Transliteration of Hebrew
ISO	690-1975	Documentation - Bibliographical references - Essential and supplementary elements
ISO	832-1975	Documentation - Bibliographical references - Abbreviations of typical words

ISO		Title
ISO/R	843-1968	International system for the transliteration of Greek characters into Latin characters
ISO	999-1975	Documentation - Index of a publication
ISO	1086-1975	Documentation - Title leaves of a book
ISO	2108-1978 2nd ed.	Documentation - International standard book numbering (ISBN)
ISO	2145-1978 2nd ed.	Numbering of divisions and subdivisions in written documents
ISO	2146-1972	Directories of libraries, information and documentation centres
ISO	2384-1977	Documentation - Presentation of translations
ISO	2709-1973	Documentation - Formats for bibliographic information interchange on magnetic tape
ISO	2788-1974	Documentation - Guidelines for the establishment and development of monolingual thesauri
ISO	2789-1974	International library statistics
ISO	3166-1974	Codes for the representation of names of countries
ISO	3297-1975	Documentation - International standard serial numbering (ISSN)
ISO	3388-1977	Patent documents - Bibliographic references - Essential and complementary elements
ISO	5122-1979	Documentation - Abstract sheets in serial publications

ISO		Title
2. Terminology		
ISO/R	639-1967	Symbols for languages, countries and authorities
ISO/R	704-1968	Naming principles
ISO/R	860-1968	International unification of concepts and terms
ISO/R	919-1969	Guide for the preparation of classified vocabularies (Example of method)
ISO/R	1087-1969	Vocabulary of terminology
ISO/R	1149-1969	Layout of multilingual classified vocabularies
ISO	1951-1973	Lexicographical symbols particularly for use in classified defining vocabularies
3. Data processing		
ISO	646-1973	7-bit-coded character set for information processing interchange
ISO	962-1974	Information processing-Implementation of the 7-bit coded character set and its 7-bit and 8-bit extensions on 9-track 12,7 mm (o, 5 in) magnetic tape
ISO	1001-1979	Information processing - Magnetic tape labelling and file structure for information interchange
ISO	1004-1977	Print specifications for magnetic ink character recognition

ISO		Title
ISO	1028-1973	Information processing - Flowchart symbols
ISO	1073/1-1976	Alphanumeric character sets for optical recognition - Part I: Character set OCR-A Shapes and dimension of the printed image
ISO	1073/11-1976	Alphanumeric character sets for optical recognition - Part II: Character set OCR-B - Shapes and dimensions of the printed image
ISO	1113-1979	Information processing - Representation of the 7-bit coded character set on punched tape
ISO	1679-1973	Information processing - Representation of 7-bit coded character set on 12-row punched cards
ISO/R	1831/1971	Printing specifications for optical character recognition
ISO	2021-1975	Information processing - Representation of 8-bit patterns on 12-row punched cards
ISO	2022-1973	Code extension techniques for use with the ISO 7-bit coded character set
ISO	2047-1975	Information processing - Graphical representations for the control characters of the 7-bit coded character set
ISO	2375-1974	Data processing - Procedure for registration of escape sequences

ISO		Title
ISO	2382/1-1974	Data processing -Vocabulary - Section 01: Fundamental terms
ISO	2382/11-1976	Data processing - Vocabulary - Section 02: Arithmetic and logic operations
ISO	2382/111-1976	Data processing - Vocabulary - Section 03: Equipment technology (selected terms)
ISO	2382/IV-1974	Data processing - Vocabulary - Section 04: Organization of data
ISO	2382/V-1974	Data processing - Vocabulary -Section 05: Representation of data
ISO	2382/VI-1974	Data processing - Vocabulary -Section 06: Preparation and handling of data
ISO	2382/VII-1977	Data processing - Vocabulary -Section 07: Digital Computer Programming
ISO	2382/X-1979	Data processing - Vocabulary - Section 10: Operating techniques and facilities
ISO	2382/XI-1976	Data processing - Vocabulary -Section 11: Control, input-output and arithmetic equipment
ISO	2382/XIV-1978	Data processing - Vocabulary -Section 12: Data media, storage and related equipment
ISO	2382/XIV-1978	Data processing - Vocabulary -Section 14: Reliability, maintenance and availability
ISO	2382/XVI-1978	Data processing - Vocabulary - Section 16: Information theory
ISO	2636-1973	Information processing - Conventions for incorporating flowchart symbols in flow-charts

ISO		Title
ISO	2711-1973	Information processing interchange - Representation of ordinal dates
ISO	3275-1974	Information processing - Implementation of the 7-bit coded character set and its 7-bit and 8-bit extensions on 3,81 mm magnetic tape cassette for data interchange
ISO	3307-1975	Information interchange - Representations of time of the day
ISO	4341-1978	Information processing - Magnetic tape cassette and cartridge labelling and file structure for information interchange
ISO	4873-1979	Information processing - 8-bit coded character set for information interchange

4. Documentary reproduction

ISO	435-1975	Documentary reproduction - ISO conventional typographical character for legibility tests (ISO character)
ISO	446-1975	Micrcopying - ISO No. 1 Mire - Description and use in photographic documentary reproduction
ISO	689-1975	Micrcopying - ISO micromire - Description and use for checking a reading apparatus
ISO	782-1975	Micrcopying - Measurement of the screen luminance of microfilm readers

ISO		Title
ISO	1116-1975	Microcopying - 16 mm and 35 mm microfilms spools and reels
ISO	2707-1976	Microcopying - Transparent A6 size microfiche of uniform division - Image arrangements No. 1 and No. 2
ISO	2708-1976	Microcopying - Transparent A6 size microfiche of variable division - Image arrangements A and B
ISO	2803-1974	Photography -Silver-gelatin type microfilms - Processing and storage for archival purposes
ISO	3272/II-1978	Microfilming of technical drawings and other drawing office documents - Part II: Quality criteria and control
ISO	3272/III-1975	Microcopying of technical drawings and other drawing office documents - Part III: Unitized 35 mm microfilm carriers
ISO	3334-1976	Microcopying - ISO Test Chart No. 2 - Description and use in photographic documentary reproduction
ISO	4087-1979	Microfilming of newspapers on 35 mm unperforated microfilm for archival purposes
ISO	5126-1978	Micrographics - Computer output microfiche (COM) - Microfiche A6

ISO		Title
ISO	6200-1979	Micrographics - Density of silver-gelatin type films

5. Miscellaneous

ISO	216-1975	Writing paper and certain classes of printed matter - Trimmed sizes - A and B series
ISO	2014-1976	Writing of calenda dates in all-numeric form
ISO	2015-1976	Numbering of weeks

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EXAMPLE OF KWIC INDEX

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NAL REPRESENTATIONS AND	ADEQUACY PROBLEMS.= FINITE-STATE LAN	BARHY -59-FLF
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EXAMPLE OF KWOC INDEX

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ELECTRICAL	INVESTIGATIONS OF CERTAIN FREQUENCY DEPENDENT ELECTRICAL PROPERTIES OF 'IOLOGICAL MATERIALS.	1107
ELECTRICAL	THE THERMAL AND ELECTRICAL CONDUCTIVITIES OF LEAD - BISMUTH ALLOYS.	1273
ELECTRICAL	THERMAL AND ELECTRICAL CONDUCTIVITIES OF TUNGSTEM AND TANTALUM.	1456
ELECTRICAL	ELECTRICAL AND OPTICAL PROPERTIES OF RUTILE SINGLE CRYSTALS.	1498

Annex D

EASTERN AND SOUTHERN AFRICAN MANAGEMENT INSTITUTE

Evaluation of the Information Systems Workshop

May 19th - 30th 1980

State your objectives of attending this Workshop course.

Indicate how far these objectives have been achieved:

Would you want this workshop repeated?

If so what changes would you want to see incorporated?

Annex E

EVALUATION COMMENT

From the answers given in the questionnaires, it can be deduced that, most of the participants of this workshop found the subject matter of many lectures rather new to them. Most participants wanted much practical work to be done rather than theory. However many of them found this workshop useful in the sense that, apart from it having served as a refresher course to some, many benefited from new ideas and concepts which are used in the field of information and documentation. Most of the participants indicated that they would like this type of workshop repeated. As awhole, from the answers given, in the questionnaire, I am confident to state that this workshop was useful to many participants.

Francis Inganji

EASTERN AND SOUTHERN AFRICAN MANAGEMENT INSTITUTE

INFORMATION SYSTEMS WORKSHOP
MAY 19th - MAY 31st 1980

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